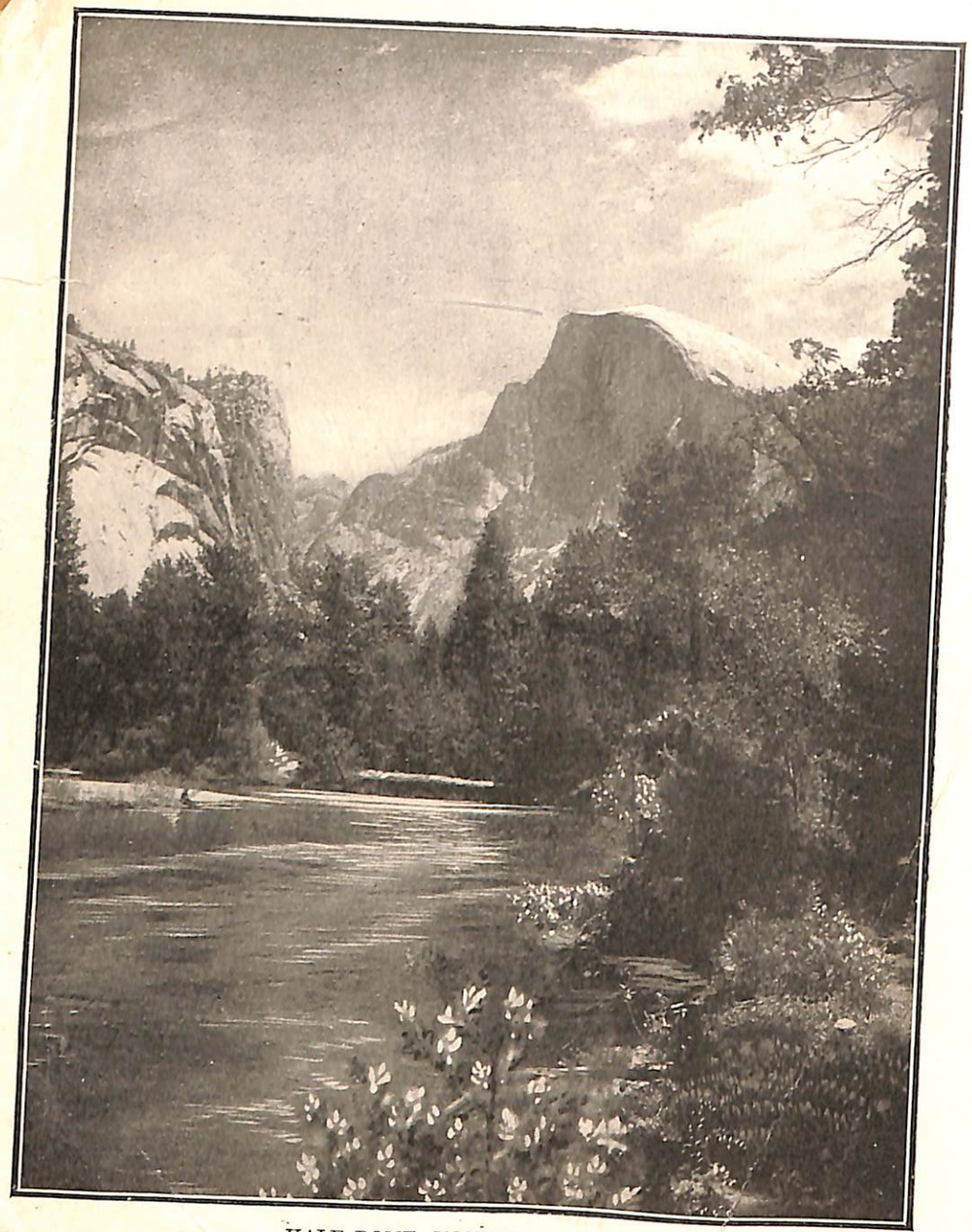
BIBLE NATURE SERIES

NUMBER ONE



HALF DOME, YOSEMITE VALLEY

Bible Nature Series

NUMBER ONE

A Natural Development of Geography, Physiology, and the other Elementary Sciences, with the Bible and Nature as a Basis of Study

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By MARION E. CADY

Author of "Bible Nature Studies," "Nature Study Note Book," Etc.

PACIFIC PRESS PUBLISHING ASSOCIATION

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THE PREFACE

THE Bible Nature Series consists of three books, and is designed for use in the fourth, fifth, and sixth years of the Primary School. The endeavor has been to present, in three graded texts, elementary studies in Nature, including introductory lessons in Geography, and lessons in elementary Physiology, these lessons being so developed in the light of revelation that all creation may become to the child an expression of divine love, infinite wisdom, and eternal power.

Nature has been marred by sin, but the light shining upon it from the pages of Inspiration makes clear its mysteries. Without this light of God's perfect revelation,—the Bible record,—the facts of creation can not be rightly interpreted, nor their wonderful lessons discerned. Hence, whatever light Inspiration throws upon creation is of infinite value.

Believing that the great Master Builder proceeded to build this world in an orderly and logical manner, each step revealing plan and method in His work, the order of creation has been adopted as the order of progression in the development of the lessons in each of the three books of the Bible Nature Series. The work of creation was followed by the disobedience of our first parents, which resulted in bringing death and destruction into the fair creation. But God has provided a plan to redeem man,—the plan of redemption. So, following the lessons on creation, briefly and simply are developed lessons giving the story of redemption from Adam's fall until he shall take his place again in Eden—the Eden restored.

It is upon this plan that this book has been constructed, and it is upon this plan that each of the succeeding books of the Series is to be constructed. It is not designed that there shall be a jumping from topic to topic, but that, in the logical order of the creation sequence, such a natural advance shall be maintained as shall tend to develop in the pupil's mind a need for the next topic to

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be presented. Thus it is believed that a unity and a mutual dependence of the several years of study in all elementary science work may be laid in the Primary School upon the completion of the sixth year.

Following the lessons in nature work, the student is prepared for an introduction to the elementary sciences as separate studies. Having been introduced in the Bible Nature Series to the subject of Geography, and having mastered all of that subject that is usually included in a primary Geography, he should now be able to complete an advanced Geography in the seventh year. Likewise a text in Physiology is now needed, and may be completed in the eighth year.

It is confidently believed that the work in Bible Nature Study, Geography, and Physiology provided for the Primary Schools will lay an excellent foundation for all further study of the sciences in both Intermediate and Training Schools.

But best of all will be the ability gained by the pupil to discriminate between truth and error. He will have learned how to use the unerring standard—the Bible—in the study of creation, and to reject all that is "science falsely so called," whose fruit is infidelity and skepticism.

Special Features.—To accompany the text, Note Books have been prepared for the pupil's use. These are profusely illustrated with appropriate and beautiful pen drawings. These Note Books, in the hands of the pupils, will greatly aid the teacher in carrying on the Nature Study work. Nature Study Drawing and Note Book No. 1 is designed to accompany No. 1 of the Bible Nature Series, and the Note Book Requirements suggested in connection with the lessons in the text may be executed in this book. Thus is the pupil encouraged to give back to the teacher in drawings and compositions what he has received in study and in recitation. In this way, work is provided for the hand as well as for the head, and facts are more deeply impressed upon the memory by means of reproduction.

Especially are the Skeleton Outline Maps accompanying the Note Books valuable as a means of making graphic the facts of the text, and impressing not only physical and political outlines, but especially the principles of Physical Geography, which are largely responsible for the industrial and political conditions of

to-day. The repeated lettering of names upon these skeleton maps is an effective device for teaching Spelling, as, upon correct outline maps, the pupil is requested to show the physical and political features of the hemispheres and continents studied.

The Note Book Requirements are by no means intended to be arbitrary, but only suggestive. Many teachers may wish to make their own requirements. Others will be able to supplement those given, and adapt them to the needs of their particular classes.

A general treatment of certain subjects has been necessary in order to make such study possible for all children in all localities. By suggestive questions, however, an effort has been made to localize such topics for the individual pupil. The child should be encouraged to study his own environment, and to explain its life and conditions by the universal facts presented in the text.

Illustrations.—The illustrations have been chosen, not for their value as mere pictures, but for their teaching and illustrative value. These have been largely selected from private collections. However, many drawings have been made especially for the text, among which are the chapter headings and the physical and political maps. In this first book of the Series, two styles of map drawing are presented. The hemisphere and the continent of North America appear first in *relief-map* projection, and the pupil is given a bird's-eye view of the contour; then follow the colored *physical maps* for more detailed study.

The lessons in the Bible Nature Series are the result of simplifying and properly grading the subject-matter contained in "Bible Nature Studies." These lessons have been adapted for use by being worked out in the schoolroom, with children in the grades for which the books are designed. This work has been done by Miss Katherine B. Hale, a teacher of long experience. For several years Miss Hale was director of the Walla Walla College Normal Department and is now in charge of the Educational Department of the California Conference.

Helpful suggestions and criticisms will be welcomed by the author.

M. E. CADY.

College Place, Wash., Oct. 1, 1911.

Suggestions to Teachers

The following are a few points that the teachers should constantly emphasize in teaching the Bible Nature lessons:—

1. The Bible is the only unquestionable source of authority in the study of God's created works. Develop in your pupils an intelligent, living faith in the word of God.

2. From the known to the unknown, from the earthly to the heavenly, from the natural to the spiritual, is the divine method in teaching, as illustrated by the Great Teacher in the parables He uttered. If you stop short of the spiritual, your pupils will suffer an irreparable loss. You have fed them husks and shucks, but no kernel, no meat.

3. As far as possible, teach directly from nature. If you can not go out to it with your pupils, then if possible bring it to them. Put yourself out to provide the materials necessary for illustrating the lessons. "Nature is a living, healthful teacher."

4. Have your pupils give back to you what you have given to them. This they can do orally, by drawings, and by compositions. What the pupils give back to the teacher they know, but what you give to them they may not comprehend. Test their knowledge frequently. Insist on definiteness and accuracy of expression, whether oral or written. Clear statements, correct spelling, legible writing, good drawing, are important elements in an education, and can be wonderfully developed in the Bible Nature classes.

5. Do not allow your pupils to use words or scientific terms which they can not correctly spell and define. Have frequent spelling and definition tests, and take these into account in giving credits of standing.

6. The knowledge of creation is the knowledge of the Creator. His knowledge and wisdom are expressed in the things of nature. Impress upon the pupils that they are thinking the thoughts of God as they study and contemplate His works. Creation and redemption will be the ever-delighting and never-ending themes of study throughout the years of eternity. Impress upon the pupils that in the Bible Nature lessons they begin a study which, if rightly carried forward, will never end, and that a righteous character is the only passport that will insure admission to the heavenly school.

M. E. C.

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CHAPTER I

IN THE BEGINNING

(Scripture Basis, Gen. 1:1, 2)

"Darkness was upon the face of the deep."

Lesson I

The Creator and the Creation

I have made the earth and created man upon it. Isa. 45: 12.

Look about you. Look above you. There are birds in the air. There are fish in the sea. There are trees on the hillside. There are clouds in the sky. There are creatures in the wood. The world upon which we live is great, and wide, and beautiful, and wonderful.

The outside of the earth is called its surface.

The surface of the earth is so very large that if a person were to travel as long as he lived he could see but a small part of it.

Upon the earth's surface there are many interesting things to study, and yet one may study a lifetime without learning all there is to learn about any one thing.

Beneath the earth's surface is much that is interesting to learn about; and high above our earth are still more interesting objects of study.

Men have learned that the earth is round like a ball, and by going forward in the same direction, they have traveled around the world.

But although men may travel around the world, and although they may learn many things about the beautiful things upon, under, and above its broad surface, they have often been puzzled by such questions as these: Have these things always existed? Who made them all? When were they made?

Ancient heathen peoples had queer ideas about the world and how it is kept in space. Having no knowledge of the Creator, they were unable to understand His creation.

But it is not necessary for us to be ignorant concerning the creation of the earth. The Bible tells us the story of the creation in plain and simple language.

In the first verse of the Bible, we are told the complete story in ten easy words: "In the beginning God created the heaven and the earth." God is the Creator. He created the heaven and the earth. He created them in the beginning. He placed the earth in space, and set it in motion.

Questions

1. Can you name something beneath the earth's surface?
2. Name something above the earth's surface.
3. What is the shape of the earth?
4. Why were the ancients ignorant concerning creation? Rom. 1:21, 22.
5. What three things do we learn from Gen. 1:1?

Lesson II

The Earth in the Beginning

The earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters. Gen. 1:2.

The earth's surface is made up of land and water.

The land and the water were created by the word of God.

In the beginning, water covered the entire surface of the earth. No dry land was seen above the water-level.

Dense darkness rested upon the face of the waters.

The earth was at that time without form.

The earth was void, or empty; for it did not yet contain the things which God had planned to place upon it.

But the Spirit of God was present to "move," or work, upon the face of the waters, and change the dark, empty, formless mass into a delightful abode, according to the Creator's own beautiful plan.

This work of producing land and water, and giving to it the shape of a ball, was *creation*.

This wonderful power — the power to create — belongs to the true God alone. Man has no power to create.

The power that in the beginning created our world, is able to create clean hearts by speaking the word only.

Questions

1. Of what does the earth's surface consist?
2. How was the earth created? How do you know?
3. Describe the earth in the beginning.
4. What was the work of the Spirit of God in creation?
5. What is creation?
6. What was David's prayer when he longed for a change of heart? Ps. 51:10.

7. What reason had David to believe that God had power to create within him a clean heart?
8. Why can not *man* make something out of nothing?
9. Who alone has this power?
10. What is the work of the Spirit of God in the creating of clean hearts?

Note Book Requirement

Upon page 5 of "Nature Study Drawing and Note Book" copy your answer to the third question.

Lesson III

The Earth Made Beautiful

O Lord, how manifold are Thy works! in wisdom hast Thou made them all: the earth is full of Thy riches. Ps. 104: 24.

At first darkness covered the face of the earth.

The mighty voice of God spoke, saying, "Let there be light."

At the command of God, light appeared and darkness fled.

The rays of light fell upon the water that already covered the earth.

Heat is the companion of light, and will turn water into vapor.

Vapor is water gas, which rises from the earth.

The heat connected with the light in the beginning, formed vapor, which wrapped the earth about as a garment.

The light was divided from the darkness, and the evening and the morning were the first day.

Between the vapor above and the water beneath, God desired that there should be a clear, open space. This He made upon the second day, and called it the *firmament.*

The firmament is filled with air, but it is called the "open firmament," because the air can not be seen.

Upon the third day God said: "Let the waters under the heaven be gathered together unto one place, and let the dry land appear." And it was so.

God called the dry land *earth*, and to it He spoke, saying, "Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth."

Upon the fourth day, God set apart permanent light-givers, and gave them their work.

God made the creatures of the sea and the creatures of the air upon the fifth day.

Upon the sixth day the animals that were to live upon the dry land were created. Man, also, the highest of the animal creation, was made upon the sixth day.

"In six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day." Ex. 20: 11.

Questions

1. Where is the story of the first day given?
2. Where is the story of the second day found?
3. Where is the story of the third recorded? Fourth? Fifth? Sixth?
4. Tell the story of each of these days of creation.
5. What wisdom do you see in the order of each day's work?

CHAPTER II

LIGHT AND HEAT

(Scripture Basis, Gen. 1:3-5)

"And God said, Let there be light: and there was light."

Lesson IV

Darkness and Light

The darkness and the light are both alike to Thee. Ps. 139: 12.

A ball thrown whirling into the air turns about a line passing through its center. This line is its *axis.*

Like the whirling ball, our earth turns upon its axis in space.

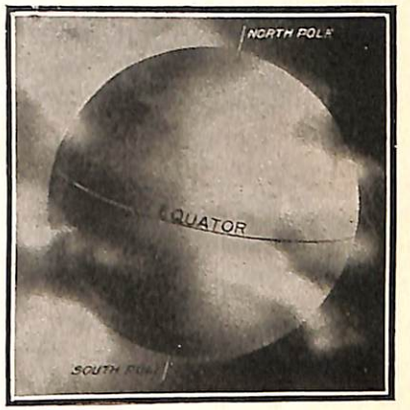
Upon the first day of creation, God divided the light from the darkness. He called the light *day;* He called the darkness *night.*

The turning of the earth upon its axis causes day and night.

It takes the earth twenty-four hours to move once around on its axis.

The day is made of darkness and light — evening and morning.

The evening is the first part of the day. The morning follows the evening.



It is day on one side of the earth while it is night on the opposite side.

It is God that made the earth, and day after day He turns it upon its axis in space.

More than 2,000,000 times has it whirled upon its axis since that first period of twenty-four hours!

The opposite ends of the earth's axis are called the *North Pole* and the *South Pole.*

The North Pole is the most northern point on the earth's surface.

The South Pole is the most southern point on the earth's surface.

A line drawn around the globe, just half way between the North Pole and the South Pole, dividing the surface of the earth into two equal parts, is known as the *Equator.* Upon the globe trace the Equator, and mark the poles.

Questions

1. What is meant by the earth's axis?
2. How long does it take the earth to turn once upon its axis?
3. What does this turning upon its axis cause?

4. What is meant by the earth's North Pole?
5. What is meant by the South Pole?
6. Describe the Equator.
7. If you were to travel to either pole, do you think you could see it?
8. Would you expect to see the Equator if you were to travel across it?
9. Is the day now as long in hours, minutes, and seconds as it was the first day?
10. Draw a circle, and represent upon it the positions of the Equator and the poles.

Note Book Requirement

Describe in your own words the work of the Creator upon the first day of the week of creation. Copy on page 6.

Lesson V

A Ray of Light

Let your light so shine before men, that they may see your good works, and glorify your Father which is in heaven. Matt. 5: 16.

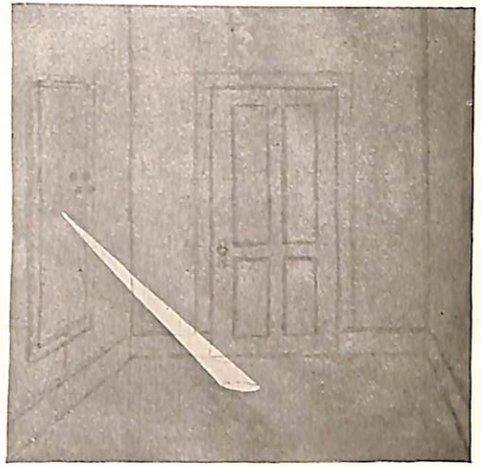
Do you see that ray of light streaming into the darkened room? Every ray of light brings to earth a message of love and a lesson of truth. The better to understand this message of God's love, we shall in this lesson study something about a ray of light.

First, you will notice that, as a ray of light streams into a darkened room, it falls upon tiny dust particles which happen to be astir in the air.

Notice that the ray of light moves in a straight line until it falls upon the floor. There it leaves a picture, or image, of the sun. Upon the floor the image is oval, because the light falls slantingly, but the picture will be round

if the ray falls perpendicularly upon a screen or upon a piece of paper.

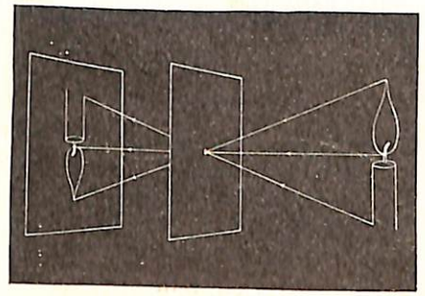
Light from every brilliant thing travels in straight lines; and from every point of a light-giving object, rays of light are sent out in every direction. Thus the rays of light from a candle flame carry light to every part of the room.



A RAY OF LIGHT

Now if you place a card in front of the flame, a shadow will be thrown upon the wall beyond. If, however, the card contains a single hole, a few of the rays may pass through the hole and fall upon the wall beyond.

This leads me to explain to you these two curious pictures: From the top of the candle flame, rays of light start off in all directions, but only one can pass through the hole in the cardboard, and, traveling in a straight line, it reaches the wall *below* the opening in the card.

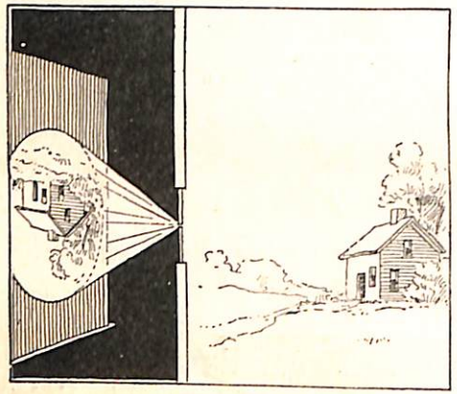


From the bottom of the candle, but one ray can pass through the hole, and, traveling in a straight line until it reaches the wall, it will throw the image of the bottom of the candle *above* the opening in the card.

Some rays from each of the other parts of the flame get through the hole, and thus a complete image is made and the whole flame is seen on the screen. The whole image of the flame is made up of hundreds of little images, you see.

Now if you will go into a dark room, and place in the path of a single ray of light a piece of white cardboard, you will see a curious thing. All the objects outside will be distinctly pictured upon the cardboard, only they will be upside down.

Just as the rays of light from the top of the candle flame fall below the hole in the small cardboard, so now the rays of light from the chimney and the tall tree-tops, by traveling in a straight line, fall upon the cardboard screen *below* the opening. Likewise those rays from the base of the house and from the ground will surely fall upon the cardboard *above* the opening through which they enter. Thus the picture is inverted, just as before.



Did you know before that light had to do with picture making? A photographer's camera simply provides a dark box in which light can do its interesting work. You will be interested to learn more of this subject later.

Questions

1. What is the meaning of the word *perpendicular?* *Perpendicularly?*

2. Have you ever noticed the round, bright spots of light under your feet as you walked through a forest on a sunny day? What made these? and of what are the bright circles images?
3. Why can we not see around the corner of a house?
4. What does every ray of light bring to earth?
5. In what direction does every ray of light travel?
6. If light had no rules of behavior, but every little ray did just as it pleased, could it produce images—could it make pictures for the photographer?

Note Book Requirements

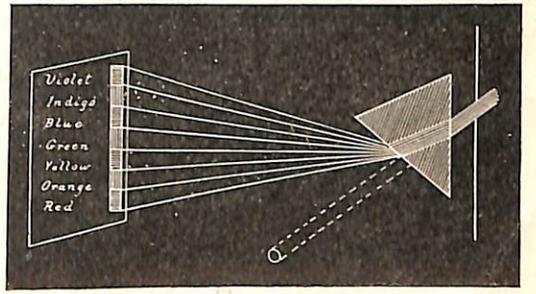
1. Upon page 7 of your note book, answer the above questions.
2. Explain in your own words the first drawing on page 8.

Lesson VI

The Colors of Light

One very beautiful thing about light is color. If it were not for light, there would be no color.

You may discover that light has color by placing a prism in the path of a ray of light. When the prism is held in a certain position, it will cast upon the wall or floor a many-colored spot.



COLORS

Study closely this spot. You notice that in the middle it is bright green and yellow. On one side it is orange and red, and on the other side blue, indigo, and violet.

It is impossible to tell where one of these colors begins

or ends, for the seven colors, from red to violet, are beautifully blended.

These colors of light make beautiful the land, the sea, and the sky, and are tokens to us of our Father's love.

He clothed the earth with verdure. He knew just what soft tints to use, and what shades of color would be most restful in landscape scenery.

A PRISM

He gave to the animals, as well as to the plants, bright and pleasing garments of color.

He spread above our earth a canopy of soft blue, across which at times He throws clouds, painted in gorgeous and charming colors.

As a token of His love and faithfulness, He spreads in our heavens the bow of His covenant, a beautiful bow, like the one that surrounds His throne,—the rainbow, which never fails to charm and delight.

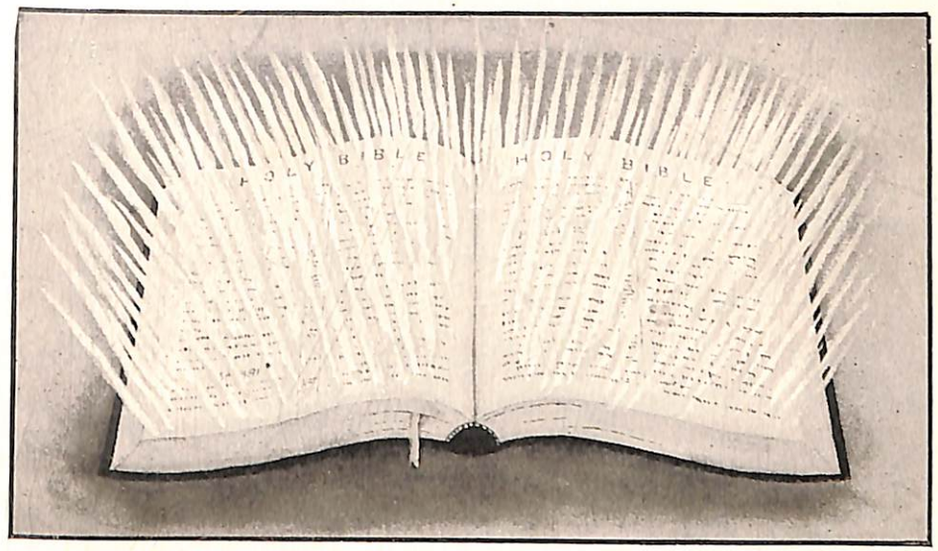
In studying God's creation we shall learn much about color; and observing the beautiful tints and shades found in nature, we shall appreciate more and more the fact that light is doing for us marvelous things. We will not forget that light is a master painter, as well as a photographer.

Questions

1. Of what is the rainbow a token?
2. When is it seen in the heavens?
3. When was it first seen there?
4. In what order are the colors arranged?
5. Make a drawing in colors to represent the rainbow.

Note Book Requirements

1. On page 9 copy answers to the above questions.
2. Explain the second drawing found on page 8.



"Thy word is a . . . light unto my path."

Lesson VII

Spiritual Light

The eyes of your understanding being enlightened; that ye may know what is the hope of His calling, and what the riches of the glory of His inheritance in the saints. Eph. 1: 18.

Natural light "manifests," or reveals, the objects that surround us. The sun, moon, stars, and any light-givers that man may invent, are called *natural lights.*

We behold natural objects with our natural eyes. God, who made the light, made the eye to receive the light, and He fitted the eye so that we might enjoy the beauties that the natural light reveals.

But there is another great class of light-givers. This other class is set apart to "manifest," or make plain, the truth.

We behold *natural objects* with our natural eyes, but we behold *spiritual things* with the "eyes" of our "understanding."

It is spiritual light that reveals to us right and wrong. Spiritual light will show us the pathway in which it is safe for us to walk, and will guide us faithfully day by day, so that we need not stumble into wrong-doing.

One spiritual light which our Father has provided us is the Bible. "Thy word is a lamp unto my feet, and a light unto my path." Ps. 119: 105.

Another spiritual light which God has in His love provided, is our Saviour. Jesus said of Himself, "I am the light of the world." John 8: 12. Just as Jesus "manifested" His Father while on earth, so He desires that we shall "manifest," or show, His love to those about us.

Paul speaks of "the light of the glorious gospel of Christ." 2 Cor. 4: 4. So, then, the gospel is a light.

Jesus said, "Ye are the light of the world." Matt. 5: 14. He was speaking of His disciples. Now we have learned that light does not move in a crooked path, but in a straight line. To be like the light, must we not be truthful and straightforward in all our deportment?

Requirements

1. Copy and memorize all the scriptures mentioned in the lesson.
2. Write one question for each paragraph in the lesson.

Questions

1. What is the Bible definition of light? Eph. 5: 13.
2. Name two great classes of light-givers.
3. What does each class reveal?

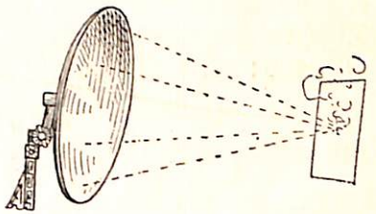
Lesson VIII

The Companion of Light

There is nothing hid from the heat thereof. Ps. 19: 6.

Place your hand in a ray of sunlight. Do you feel any warmth? Heat has been called the companion of light, because, in company with light, it comes to us from the sun. Light and heat travel many millions of miles together, and together fall upon the earth's surface.

The work of each is distinct. Light gives sight, while heat gives warmth.



Heat bounds back from objects upon which it falls, and spreads warmth through the air to everything it reaches.

The heat is a magic worker. It finds much work that it alone can do. Without heat, no plants or animals could live upon the earth's surface.

It was the heat that made such thick clouds of vapor on the first day, and made it necessary for the Lord to divide the waters from the waters, when "He established the clouds above" on the second day.

The natural lights help us to think of the spiritual lights. Just so the heat of natural things reminds us of the warmth and love that come to us in company with these spiritual lights. One's life need not be cold and lonely, if he feels the warmth of Jesus' love.

Just as the heat finds a great work to do, and is constantly busy; so the heart, warm with the love of God, will be earnest and active in His service.

Experiments

1. Prove that light has heat by passing a ray of light through a reading glass, placing the hand where the rays are brought together.
2. Take a lamp reflector, and hold it so that the sun's rays will strike the concave side. Place some paper or cloth where the rays meet at a point, and notice results.

Questions

1. Why is heat called the companion of light?
2. What is its work?
3. What was the work of heat upon the first day of creation?
4. Of what does natural heat remind us?
5. Should a Christian ever be *lukewarm* in God's service? Rev. 3:16.

Lesson IX

Climate

Heat is not evenly distributed over the earth's surface; hence it is cold in some regions and hot in others at the same time.

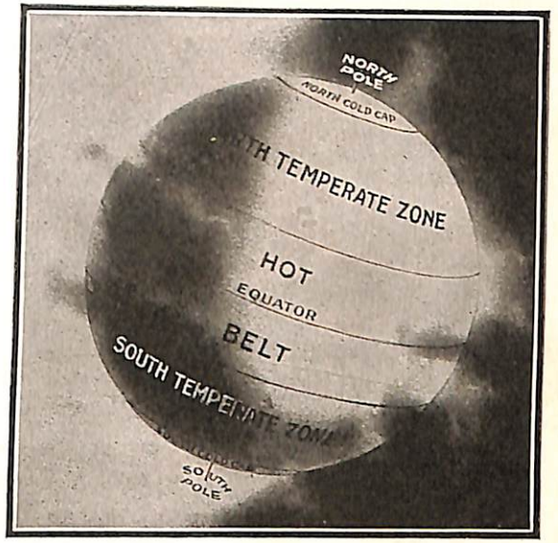
The portions of the earth which have much more warm weather than cold during the year, are said to have a *hot climate.*

Wherever there is more cold weather than warm, there is said to be a *cold climate.*

A country in which the warm and the cold parts of the year are nearly equal, is said to have a *temperate climate.*

Around the Equator there is a region that is always hot. Here the nights, as a rule, bring no relief from the weakening heat of the day. This region is called the *Hot Belt.*

About the North Pole, and extending nearly one fourth of the way to the Equator, is the *North Cold Cap.* Here the climate is so cold that no crops can grow.



About the South Pole is another cold region, called the *South Cold Cap.* This cold region extends more than one fourth of the way to the Equator.

Between the Hot Belt and the South Cold Cap is the South Temperate Belt.

Between the Hot Belt and the North Cold Cap is the North Temperate Belt.

Nearly one half of the land in the world lies in the North Temperate Belt. Here the winters are cold, but the summers are long enough for crops to ripen.

Questions

1. Why do we say Cold *Cap* rather than Cold *Belt?* (See globe.)
2. Describe the axis of the globe.
3. Describe the Equator.
4. In which heat belt do you live?
5. Is the weather hot or cold?
6. Moist or dry? Calm or stormy? Clear or cloudy?
7. In what belt do the large bodies of land lie?
8. Is this a wise arrangement?

Note Book Requirement

Write a clear explanation of the drawings on page 10.

Lesson X

Why We Need Clothing

Dost thou know . . . how thy garments are warm? Job 37: 16, 17.

In some ways we are much like a candle. Every one knows that our bodies feel warm to the touch. If one gets into a cold bed on a winter's night, the body soon warms the bed. The heat of the body, like a fire always burning, keeps up this warmth.

But our bodies are always giving out their heat to the air. We lose some heat in the breath, but we lose a great deal more from the skin.

To assist in keeping the temperature of the body just right, no matter how hot or cold it is outside, clothing is worn.

When the skin is bare, the heat passes away from the body rapidly, and if the air outside is colder than the heat within the body, we feel chilly and cold. So clothing is needed in cold weather.

In hot countries, when the body is left bare, the rays of the sun tend to burn the skin. Hence clothing is worn in hot weather.

Clothing saves the skin from being torn or hurt, and protects against sudden change of weather.

The clothing must be suited to the climate and the season of the year. Summer clothing must be such as will allow the heat of the body to escape. Winter clothing should be such as will retain the heat, or will not allow it to escape rapidly.

Children must wear proper outside garments on going out, and take them off on coming indoors. They should not sit in a warm schoolroom with outside garments on, such as wraps and rubbers.

If one gets his clothing wet, he should take the shortest way home, remove the damp garments, and put on dry, warm clothing. Always change, at once, wet shoes and stockings.

A wise doctor has said, "Only beggars and fools go cold. The beggars lack clothes; the fools do not know enough to wear them."

CHAPTER III

AIR AND SOUND

(Scripture Basis, Gen. 1:6-8)

"And God said, Let there be a firmament in the midst of the waters."

Lesson XI

The Firmament

He established the clouds above. Prov. 8:28.

The firmament is the open space which God created between the waters which He placed beneath the firmament and those which He placed above it.

This space is occupied by something which we can not see, although we could not live or move without it.

We know that the air fills the firmament, for although it can not be seen, it can be felt; and we can see many things that it does when it is in motion.

The air has weight, and it is the weight of the air that pushes up every object lighter than itself.

Upon the second day of creation the clouds were balanced above by the weight of the air.

Neither plants nor animals can live without air, and so the Creator placed air around the earth before He created any life upon its surface.

Thus the air was created upon the second day, and the earth turned upon its axis the second time, making the evening and the morning.

Questions

1. What is a room full of when the furniture is all taken out?
2. Mention things that are full of air.
3. Of what use was air on the second day of creation, before plants and animals were made?
4. Copy and memorize Gen. 1: 6-8.

Note Book Requirements

1. Describe the work of the second day of creation on page 11.
2. Write the answers to the above questions.

Lesson XII

The Wind

The wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh, and whither it goeth. John 3:8.

When the air is moving along so swiftly that we can feel it on our faces, we call it *wind.*

On a windy day we see the specks of dust whirling in the air; we see the moving of grasses and the fluttering of leaves; we hear the flapping of flags and the snapping of clothes upon the line, as they are hit by the passing air; and we ask, "Whence and whither, O Wind?"

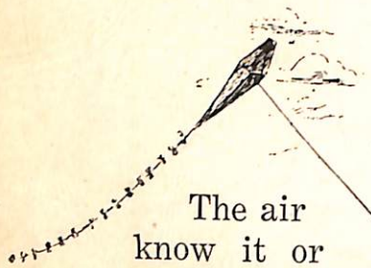
It is heat that sets the air in motion, and this is how the work is done: Outdoors the air gets heat from the sun. The air near the surface of the earth becomes heated first, and as warm air is lighter than cold air, the warm air rises, letting the cold air rush in to take its place.

Now in the Hot Belt there is much heated air always rising. This hot air is replaced by the cold air that travels toward this hot region from both the north and the south.

Thus wind circuits are found upon the earth, and, as Solomon said, "The wind goeth toward the south, and turneth about unto the north; it whirleth about continually, and the wind returneth again according to his circuits."

Now the air above a body of dry land receives heat faster in the daytime than does the air above a body of water, and so in the daytime the cool air from the sea moves toward the dry land, where the heated air is rapidly rising, and a cooling *sea breeze* is the result.

At night the air over the sea is warmer than the air over the dry land, and the cool air from the land flows in to take the place of the heated air over the water, and a *land breeze* is created.

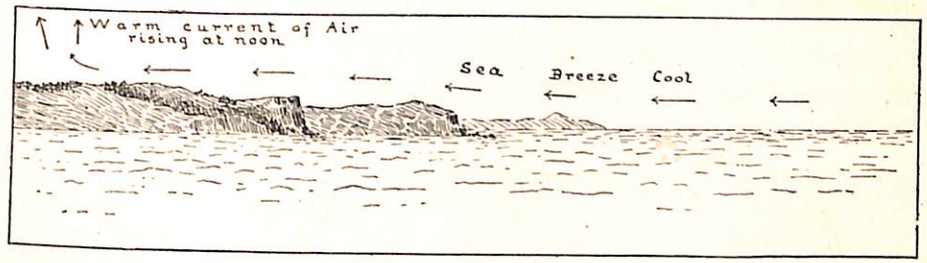


The air is of use in many ways, and whether we know it or not, is always doing much work for us. Indeed, the wind is very strong, and the faster it moves the more it can do.

Unpleasant and hurtful odors are constantly rising from around our homes, and the air is kept pure by the winds.

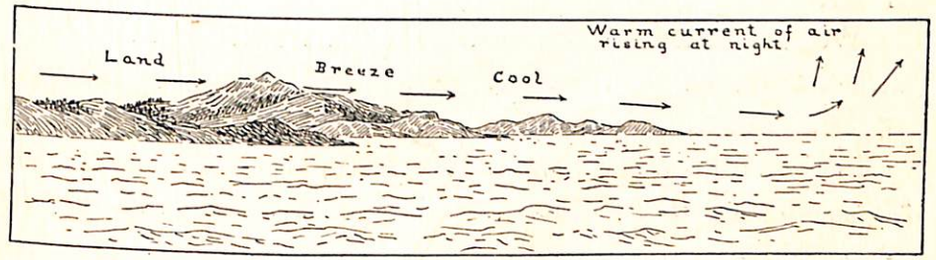
You have often seen the rain-clouds overhead. Their moisture is carried from place to place by the winds.

Listen to the clattering windmills on a windy day.



Water is pumped by the windmill, and machinery is turned by the water-power.

Winds are named from the direction in which they blow. Winds that blow from the south are called *south winds*. Winds that blow from the north are known as *north winds*. Those that blow from the east are *east winds*. Those that blow from the west are *west winds*.



Questions

1. What is wind?
2. What do we see on a windy day?
3. What does God use to set the air in motion?
4. Where on the globe is there much heated air always rising?

5. Why does warm air rise?
6. What did Solomon say about the wind circuits? Eccl. 1: 6.
7. What is a *sea breeze?*
8. Explain how it is caused.
9. What is a *land breeze?*
10. How is it caused?
11. Name four uses of wind.
12. How are winds named?

Note Book Requirement

On pages 14 and 15 copy your answers to the above questions.

Lesson XIII

The Ships of the Air

Dost thou know the balancings of the clouds, the wondrous works of Him which is perfect in knowledge? Job 37: 16.

Clouds are only chilled water-vapor floating high in the air.

We have learned that heat will turn water into vapor, and now we see that the air gets moist or wet by absorbing this vapor.

Although vapor is constantly rising from all damp surfaces, yet we can not see it until it becomes chilled in the air above us.

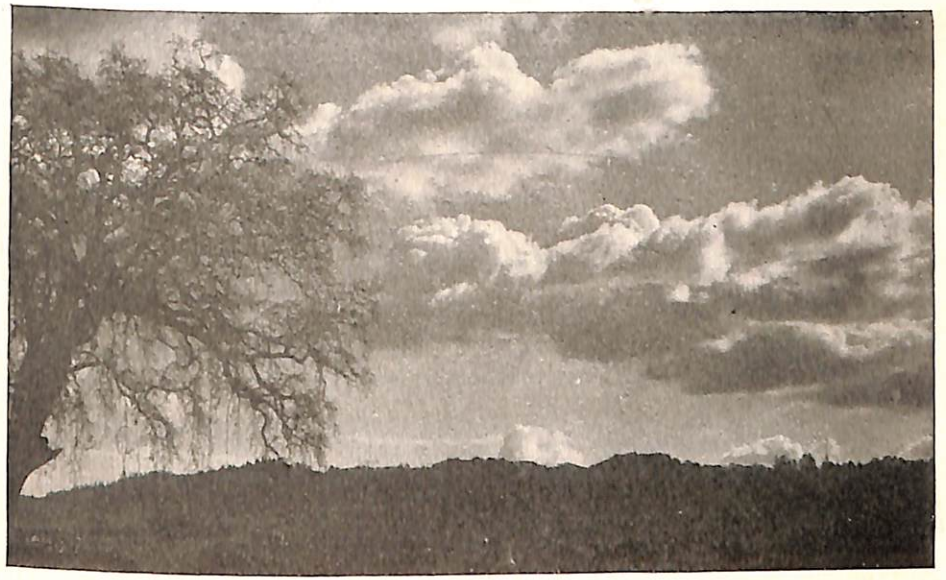
The air is heavier than the vapor, and so pushes the vapor up. Finally the vapor reaches a place where it is no longer lighter than the air. Here it is balanced in the firmament overhead, and when chilled can be seen as clouds.

Clouds are, on an average, only about two and a half

miles from the earth. The distance at which they remain above the earth depends upon their weight.

Some clouds are heavier than others, but each will rise to that place where the weight of the cloud is balanced in the air overhead.

The Lord uses heat to change the water into vapor, and then He uses the air to lift the vapor up into the firmament.



CLOUDS

He uses the air to push the clouds over the dry places of the earth, where He causes them to drop their moisture upon the parched land.

People sometimes fancy they see curious forms in the sky. Sometimes clouds look like flocks of fleecy white sheep, which the wind, like a shepherd, is driving across the sky. Sometimes they seem to pass above us like white-sailed ships upon a blue sea.

Just at sunset the clouds usually appear the most beautiful, for they seem to be edged with crimson and gold.

Questions

1. What is vapor?
2. Which is heavier, air or vapor?
3. What are clouds?
4. Describe the most beautiful clouds you have ever seen.
5. How are water-drops made to don their "vapor dresses"?
6. How are the ships in which these "vapor-dressed" water-drops travel, driven across the blue sea above us?

Note Book Requirement

On page 13 describe the clouds, and tell their use.

Lesson XIV

How Birds Fly

Doth the hawk fly by thy wisdom, and stretch her wings toward the south? Job 39: 26.

O that I had wings like a dove! for then would I fly away, and be at rest. Ps. 55: 6.

Flitting hither and yon in the open firmament of the heaven, are happy winged creatures "of the air." Did you ever try to understand "the way" of a bird in the air?

Were there no air, it would be impossible for birds to fly; and yet a bird does not float in the air, as do clouds. They do not rise and sail above us as does a balloon. The wings of a bird are very large when stretched out, for it

takes very large wings to raise even a small body in the air. When spread, the wing is somewhat rounded on the upper surface, and hollowed out underneath.

The feathers of a bird's wing are strong and light, and so make the wing very large without adding much to its weight; and the feathers underlap, making a solid surface as the wing goes downward against the air.

An open umbrella is easily pushed upward against the air, but not so easily pulled downward. This is because the air is easily parted by the rounded surface, but is caught and held by the inner, hollowed surface of the umbrella.

The bird's wing is in shape not unlike the umbrella, and it works against the air in much the same way. The air slides easily from the upper, round surface of the wing, but is caught and held within the hollowed surface underneath.

The downward motion of a bird's wing crowds the particles of air closer together than they were before; but as soon as the pressure is removed, the air spreads itself again, and this lifts the bird.

The wing is lifted edgewise at each upward stroke, and is then again spread as broadly as possible for another downward stroke against the air.

The front part of the wing is stronger than the back part. The long, slender feathers of the back part of the wing give way, and let the air escape. This causes the bird to be pushed not only upward, but forward as well.

Questions

1. Do birds float in the air, as do clouds?

2. Do they rise above us, as does a balloon?
3. How is the bird able to raise itself in the air?
4. Describe a bird's wing.
5. Why is an umbrella more easily pushed upward than pulled downward?
6. Why is the bird's wing compared to an open umbrella?
7. Describe the upward motion of a bird's wing in flight.
8. Describe the downward motion.
9. Which part of the bird's wing is the stronger?
10. Of what use is this in flight?

Note Book Requirement

Copy answers to the above questions on page 12.

Lesson XV

The Breath of Life

They have all one breath. Eccl. 3: 19.

The Creator breathed into the nostrils of the first man, and he became a living soul. To the beasts also He gave the breath of life — the same breath.

All animals must breathe. None can live without breathing. It is when the breath returns to God who gave it, that we say the animal is dead.

The motions of breathing can be seen and felt, and the sound made by the air as we breathe in and out can be heard. The breath can be seen puffing from the horse's nostrils as he rests after a long, hard pull. We see the sides of the dog move in and out after he has been running. On cold mornings we can see our own breath like a cloud of steam.

It is by means of beautiful and wonderful machinery that breath is taken into the body.

Put your hand upon your chest, and breathe. The chest becomes larger when the breath is drawn in, and the air can be felt passing through the nose.

Little hairs in the nose keep any dust particles from going through. In the nose the air is warmed before going to more tender parts. From the nose the air goes into the throat and down the windpipe. The windpipe is a stiff tube in the center of the neck, in front. It opens into the back of the mouth, and serves as a passageway for the incoming and outgoing air.

At its lower end the windpipe divides into two branches, one going toward each side of the chest, and ending at the lungs.

The lungs may be thought of as two elastic bags, placed one on each side of the chest, within the bony case made by the breastbone, ribs, and backbone.

The chest sounds hollow because the lungs within are filled with air.

When the chest becomes smaller, the air is driven out as it is from the bellows when the handles are brought nearer to each other.

The clothing should be worn loosely about the chest and waist, because the lungs need plenty of room to expand when they are filled with air. Tight clothing presses upon the ribs until they are bent in, and the chest becomes smaller. If this is done in childhood, the lungs do not have a chance to grow to their full size or to expand with each breath.

The Creator wishes every one of His creatures to be strong and healthy, but no one can be strong and healthy who has weak lungs.

Questions

1. How did man become a living soul? Gen. 2:7.
2. What does the Bible teach about the breath of the beasts?
3. At death what becomes of the breath? Eccl. 12:7.
4. Through what should we always draw in the breath? Why?
5. What is the windpipe?
6. What is the chest?
7. Why should the clothing not be worn tightly around the chest and waist?

Spell and use in sentences—

lungs	breath	windpipe
chest	breathe	waist
nostril	nose	ribs

Lesson XVI

Ventilation

In the morning we rise from our beds, turn back the covering, and open the windows to let the fresh air blow upon the bedclothes and purify them.

We often hang clothing on a line outside for the same purpose. Soiled clothing is washed in water, and then hung out to dry in the open air. When dried by steam heat, the clothes do not have the same sweet smell that is given by the sunlight and air, and they are really not so clean.

There is not a room nor a closet in the home but needs

to be sweetened and purified by the entrance of good, fresh air.

If, on a cold winter's day, the doors and windows are kept tightly closed, and the air of the room is breathed over and over again, it becomes very impure. The cheeks will grow red and hot, and the head will ache.

When one wakes from sleep with a headache, it is nearly always because the air of the sleeping-room is not pure.

It is not enough simply to air the room once a day. The air must be changing all the time, when one is in it, because by use it is all the time being made impure.

In the schoolroom, where so many are breathing the same air, it very soon becomes impure unless fresh air is coming in constantly.

If there is no system of airing the room, a good way to ventilate in very cold weather is to place a board six inches wide under the lower sash. This board fills up the space made by the opening, and allows the air to come in between the sashes.

Many years ago in India one hundred and forty-six English prisoners were crowded into one room less than twenty feet square. Two little windows did not let in enough air for the poor captives to breathe, and during only one night all but twenty-three died from lack of air.

Both day and night there should be some way for the pure air to get into the house, and for the impure air to get out.

Requirements

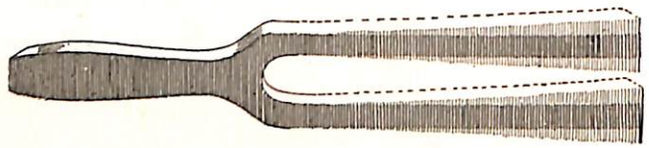
Spell and define: Ventilation, purify, purified, impure, system. Bring to class ten questions upon ventilation.

Lesson XVII

Air and Sound

Surely it is not hard, after our past study, to believe that air is of great importance. But there is still another great use for air, of which we wish you to think.

The clock is ticking in the room. What is it that brings the sound to our ears? The wind is stirring in the tree-tops outside. How is it that we can hear the rustling of the leaves? How does the sound of one's voice reach another's ear? How are the tones of a piano or of any other instrument carried across the room?



Did you know that it would not be possible for any of the sweet voices of nature to delight us if it were not for the air? It would not be possible for us to hear the warning of whistles and bells and gongs were there no air in the firmament above the earth. It is air that carries sound to the ear.

When a tuning-fork is struck, the prongs move rapidly back and forth. This jars the air particles, and tiny sound waves are set in motion and move in every direction from the fork. These waves of the air travel until they fall upon the ear.

If one is far from the cause of sound, the trembling that reaches the ear is very slight, and we hear the sound but faintly. In fact, we may not hear the sound at all.

Tones may be produced by blowing into a bottle or tube. It is the breath that sets the air in the tube in motion. The

motion of the air within the tube jars the tube itself, which, in turn, jars the air between the tube and the ear. Thus we hear.

When sounds are produced which give pleasure, they are called *musical tones.*

In instruments like the clarinet, the fife, the flute, and the piccolo, sound is made in this way. In these instruments the tone is produced by blowing into the end or across a hole in the tube. Tones are made in the common wood or tin whistle in just the same way.

The longer the tube in which the air is set in motion, the lower the tone; the shorter the tube, the higher the tone.

For the blessings of sound we may give thanks to the One who has made it possible for us to praise Him and to let our praise be heard.

Questions

1. What has air to do with sound?
2. How is sound made by the tuning-fork?
3. What are musical tones?
4. How is sound produced by blowing into a bottle?
5. Name instruments in which sound is produced by blowing across the tube.
6. What kind of tone is produced by a long tube?
7. A short tube?
8. How is the tube of a wind instrument lengthened and shortened?
9. Memorize Ps. 92: 1-5.

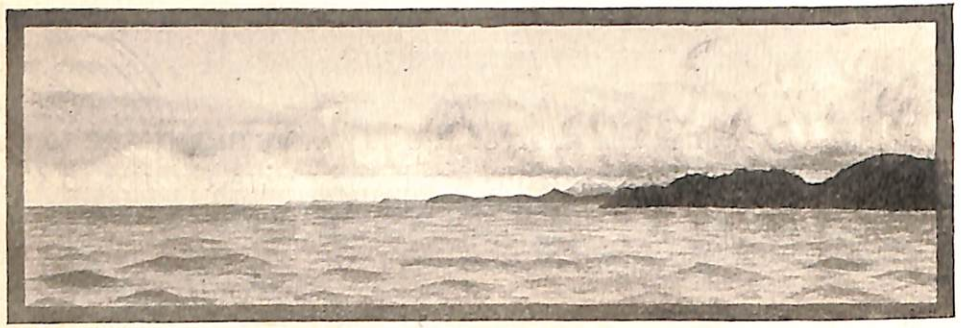
Note Book Requirement

Write answers to the above questions on page 16.

CHAPTER IV

WATER

(Scripture Basis, Gen. 1: 9, 10)



"And God said, Let the waters . . . be gathered together unto one place."

Lesson XVIII

The Gathering of the Waters

Who hath measured the waters in the hollow of His hand. Isa. 40: 12.

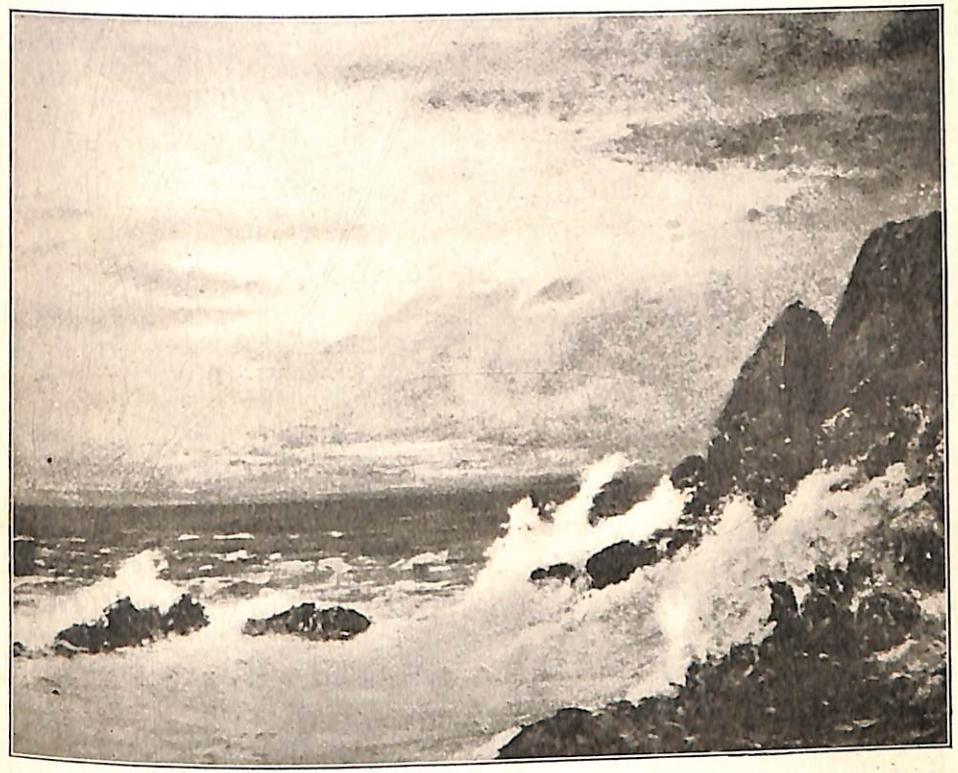
In the beginning, the surface of the earth was covered by the waters of a great "deep."

Having made light and heat, and having created the firmament and established the clouds above, the next thing done by the Creator was to cause the dry land to appear.

God said, "Let the waters under the heaven be gathered together unto one place, and let the dry land appear," and it was so.

"The gathering together of the waters called He Seas: and God saw that it was good." Gen. 1: 9, 10.

It was upon the third day of creation that God "gave



to the sea His decree, that the waters should not pass His commandment." Prov. 8: 29.

To the sea God spoke, saying, "Hitherto shalt thou come, but no further; and here shall thy proud waves be stayed." Job 38: 11.

Spell and define—

fir' ma ment	de cree'	stayed
es tab' lished	com mand' ment	ap pear'

Memorize Gen. 1: 9 and Job 38: 11.

Note Book Requirement

On page 17 describe the work done on the third day of creation.

Lesson XIX

The Conditions of Water

He saith to the snow, Be thou on the earth; likewise to the small rain, and to the great rain of His strength. Job 37: 6.

"Water, pure water, that sparkles so bright,
Beautiful, fresh, and free,
Falling from heaven like jewels of light,
Falling for you and me."

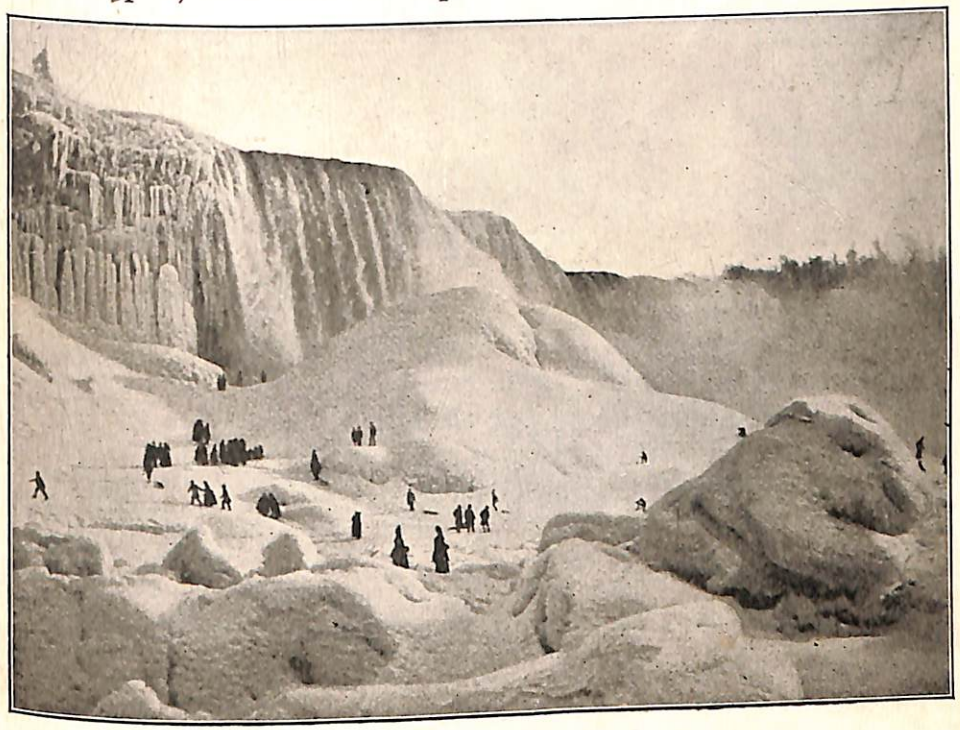
NIAGARA FALLS IN SUMMER

Water is one of God's most active servants. It is always in motion when it can be. It bubbles from the earth in springs. It ripples along in brooks. It flows swiftly and silently onward in the broad rivers. It tosses and rolls in the mighty ocean.

The water in the babbling brooks, flowing springs, wells, and rivers is in a *liquid* condition.

Place some of this liquid water in the teakettle, and set it on the stove. What is it that is trying to escape from the lid and spout? What becomes of the water when the kettle boils dry?

We have already learned that heat turns liquid water into vapor, and that as vapor water does much work.



NIAGARA FALLS IN WINTER

Water has one other very useful and interesting condition. It may become a solid. Snow, ice, frost, and hail are all forms of *solid* water.

When the falling raindrops freeze, they fall as *hailstones.*

When vapor is frozen, it falls as *snow.*

The frozen dewdrops make the *frost.*

"He [God] sendeth forth His commandment upon earth: His word runneth very swiftly.

"He giveth *snow* like wool: He scattereth the *hoarfrost* like ashes.

"He casteth forth His *ice* like morsels: who can stand before His cold?

"He sendeth out His word, and melteth them: He causeth His wind to blow, and the waters flow." Ps. 147: 15-18.

Spell and define—

liq′ uid	bub′ bles	use′ ful
es cape′	va′ por	con di′ tion
jew′ els	fro′ zen	in′ ter est ing

Questions

1. Name the three conditions in which water may exist.
2. Give the forms of the solid condition.
3. Mention work done by water as a liquid.
4. What work is done by water as a vapor?
5. Mention work done by water as a solid.

Note Book Requirement

On page 18 copy answers to the above questions.

Lesson XX

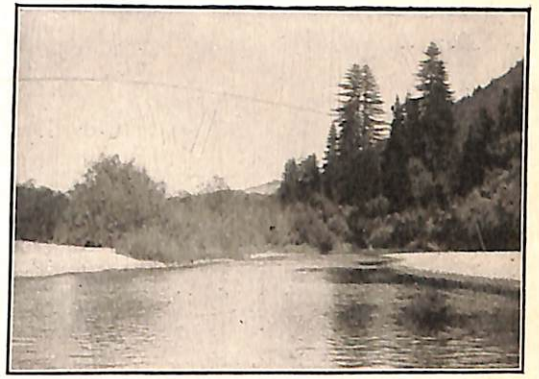
Water-Power

He sendeth the springs into the valleys, which run among the hills. Ps. 104: 10.

The rapid flow of running water is useful in turning machinery.

In hilly and mountainous regions the water-wheel is of great use to those engaged in manufacturing.

Sawmills, lumber-mills, mills for manufacturing woolen and cotton goods, and mills for many other purposes are run by water-power.



When the water comes just abreast of the axle, the wheel is called a *breast-wheel.*

A wheel which is turned by the water running over it, is called an *overshot-wheel.* The overshot-wheel is turned in the direction in which the water is flowing.

A water-wheel which is turned by the water running under it, is called an *undershot-wheel.* The undershot-wheel turns in the opposite direction from the flowing water.

By running a belt from the water-wheel to the machinery of the mill, the power of the running water is harnessed for use.

A little stream will often do the work of a hundred

horses. The larger and swifter streams can do the work of thousands of horses. Niagara Falls is doing as much work to-day in turning machinery as could be done by a line of horses eight hundred and fifty miles in length.

Machinery is sometimes turned by steam. The steam-engine pulls long trains of cars. Large ships are driven across the great oceans by enormous engines, many of them as strong as 20,000 horses.

Spell and define—

ma chin′ er y	use ful	pur′ pos es
moun′ tain ous	man u fac′ tur ing	op′ po site
en′ gine	di rec′ tion	en gaged′

Questions

1. In what way is water-power useful?
2. Where is the water-wheel of greatest use?
3. Describe a breast-wheel.
4. Describe an undershot-wheel.
5. Describe an overshot-wheel.
6. How is the machinery of the mill connected with the water-wheel?
7. How is the steam-engine of use?
8. Locate Niagara Falls on the globe.

Note Book Requirement

Copy answers to the above questions on page 19.

Lesson XXI

The Sea

The sea is His, and He made it. Ps. 95: 5.

The great body of water which the Lord gathered together into one place, He named the *sea*.

The waters of this great sea, or *ocean*, now cover three fourths of the earth's surface.

The ocean is the great source of moisture for the watering of the dry earth.

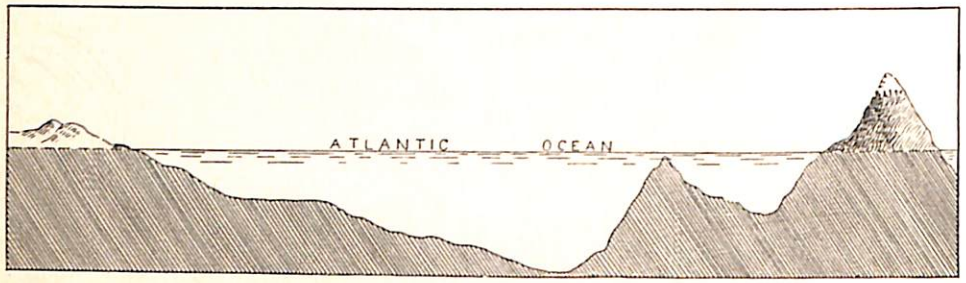
The extent of the sea is so great that one may sail for days and weeks, and yet see no land.

The ocean bed is composed of hills and valleys, and in places is covered with beds of shifting sand.

The ocean is so deep in some places that it would take a ladder five miles long to reach the bottom.

The ocean sometimes stretches great arms of water into parts of the dry land. These arms are called *gulfs*, *bays*, or *seas*.

In cold regions surrounding the North Pole and the South Pole, the ocean is always blocked with ice. Here



ships can not sail, and but little is known about these regions.

The ocean water is salt, bitter, and heavier than fresh water. Where the water is deep, it reflects the blue sky above. In shallow places water has a greenish hue.

The ocean is a great highway for travel, and by it remote parts of the earth's inhabited surface are connected.

God's last message of love and warning must cross the waves of the mighty deep, and be given to every nation, tongue, and people.

Spell and define—

ocean	ex tent′	val′ leys
source	re′ gion	con nect′ ed
gulf	hue	in hab′ it ed
bay	com posed′	mois′ ture

Questions

Make a question upon each paragraph in the lesson, and bring to class.

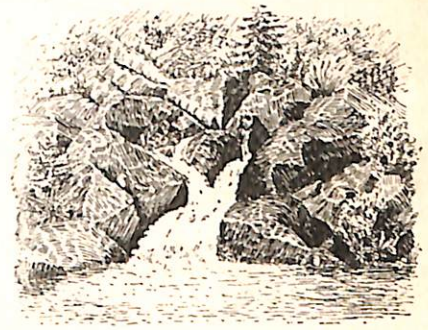
Note Book Requirement

On page 21 write a story about a day at the beach or a trip on a large body of water.

Lesson XXII

Springs and Lakes

Thou shalt be like a watered garden, and like a spring of water, whose waters fail not. Isa. 58: 11.



A *spring* is water bubbling up from the earth through an opening between rocks, or escaping as a stream.

Springs are formed by rain or snow falling on the hilltops, sinking into the soil, and filling up some underground basin, from which the water then bubbles forth.

Often the water, in seeping through the soil, comes in touch with minerals, and the spring will contain iron, sulphur, or whatever the mineral is.

A *lake* is a body of water surrounded by land.

It is formed by water filling up a hollow in the dry land. Some lakes are formed and fed by springs beneath them.

The *head* of a lake is where the water flows in. The *foot* of a lake is where the water flows out.

Often the lake has no outlet. In such cases the water is usually salt. Salt lakes are frequently called seas. The Dead Sea is a body of salt water.

Lakes drain the land, and people can travel over them in vessels. They help to beautify the earth.

Spell and define—

iron	sul′ phur	fre′ quent ly
ba′ sin	sur round′ ed	seep′ ing
drain	min′ er al	outlet

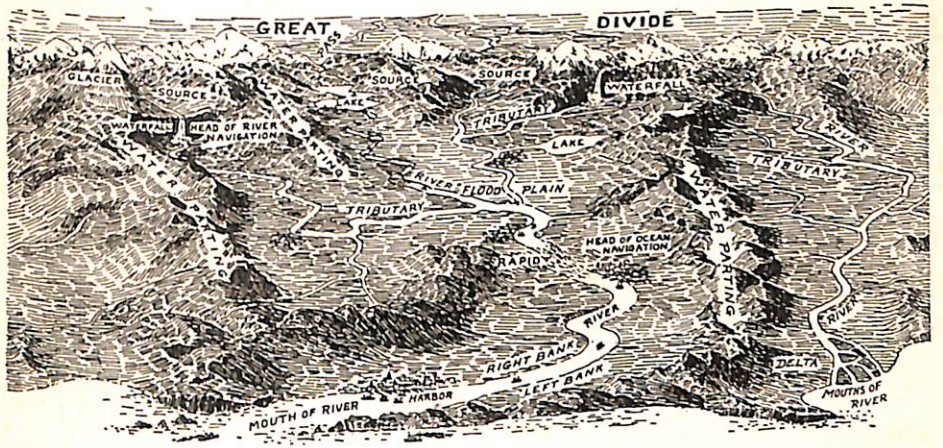
Questions

1. What is a spring?
2. How is a spring formed?

3. How are mineral springs formed?
4. What is a lake?
5. What is meant by the head of a lake?
6. What is meant by the foot of a lake?
7. What are salt lakes frequently called?
8. Find the Dead Sea on the globe.
9. What purpose do lakes serve?

Note Book Requirement

On page 22 answer the above questions.



A RIVER SYSTEM

Lesson XXIII

Rivers

All the rivers run into the sea; yet the sea is not full; unto the place from whence the rivers come, thither they return again. Eccl. 1: 7.

A *river* is a large stream of fresh water flowing through the land.

Where the river begins is called its *source.*

Where the river empties into the ocean or some other body of water, is called its *mouth*.

The land over which the river flows is called its *bed*.

The *right bank* of a river is the land on the right hand of a person who stands facing the mouth of the river.

The *left bank* of a river is the land on the left hand of a person facing the mouth of the river.

Any stream flowing into a river is called a *branch*, or *tributary*, of the river.

The land drained by a river is known as the *river basin*.

Any land that separates the basins of rivers is known as a *watershed*.

All the rivers that flow into the same body of water, when taken together, make a *river system*.

A navigable river is one on which ships can safely sail.

Many of the large cities of the world are built near rivers, because the rivers are useful to carry goods and people to and fro.

Note Book Requirement

On page 23 define each of the following:

1. A river.
2. The source of a river.
3. The mouth of a river.
4. The river bed.
5. The right bank.
6. The left bank.
7. A tributary of a river.
8. A river basin.
9. A watershed.
10. A navigable river.
11. A river system.

Lesson XXIV

The Uses of Water

If any man thirst, let him come unto Me, and drink. John 7:37.

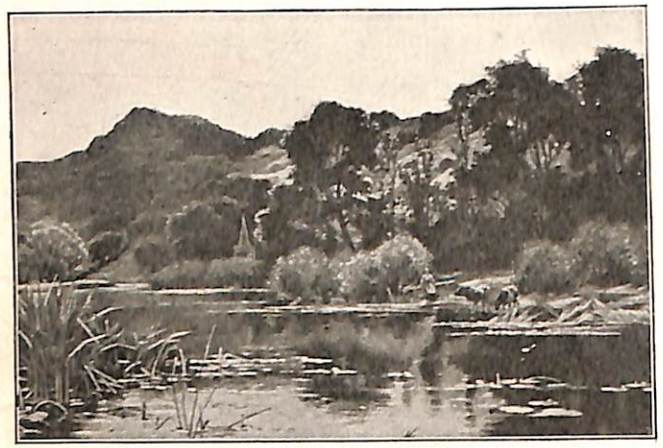
How interesting would be the story of a single drop of water, could it tell of its travels, and just what work it has found to do since the day of its creation!

In the beginning it rose and fell with the waves of the great deep. Then it flew off in the air on the wings of the wind. In company with other vapor-dressed drops, it traveled in a thick cloud above the earth's surface.

From the cloud it fell as a raindrop. Sinking down into the earth, it gave moisture to the roots of plants, or, again called back into the air, it formed at night upon a thirsty blade of grass a single dewdrop.

Perhaps falling as a snowflake, it helped to make a

warm blanket for the roots and grasses; and afterward, on melting, it sank into the earth, where it united with other drops to form a spring, which leaped from the hillside and rushed in a torrent downward to a river below.



At every change of form and in every place the tiny drop of water was of use. As a raindrop, it washed the air and made it clean, and then gave drink to thirsty grasses, herbs, and trees.

As a snowflake, it kept warm the plants beneath the white, feathery blanket.

As a dewdrop, it refreshed the thirsty leaf.

In the ocean, it helped the waves to toss the sands upon the beach, and it helped to bear up stately ships on the broad waters.

In the cloud, it moistened and warmed the air above the earth.

In the brook, it watered the plants and trees at its edge, and gave drink to the creatures of the wood and field.

Rushing along in a swift stream down the hillside, it turned the mill-wheel, grinding wheat into flour and sawing logs into lumber.

Moving on in the broad, silent river, it carried impurities from the land, and made a path for ships to travel.

Flowing from the kitchen faucet, it was used as a cleanser. How could we keep house without water!

There is nothing that will quench thirst as does water.

The tiny pores of the skin must be kept open. No one can keep well without bathing.

When ill, the feverish brow is cooled by a cloth wrung from cold water.

Ice is also of great use; and so is steam. Can you think of any ways in which they are used?

Questions

1. Of what use is water as a solid?
2. State uses of water as a vapor.
3. State some uses of water as a liquid.
4. In which of these three conditions is water most commonly at work?

Lesson XXV

Water as a Symbol

Let him that is athirst come. And whosoever will, let him take the water of life freely. Rev. 22: 17.

Here is a beautiful lesson. It was taught by the One who created water, and whose power it is that is constantly changing it from one form to another.

Travel-worn and thirsty, Jesus, the Son of God and of man, stopped at Jacob's well in Samaria. He was alone, for His disciples had gone into the village to buy food. Jesus sat at the well, waiting for the return of His disciples.

To the well came a woman of Samaria,— a poor, sinful woman, whom Jesus pitied and longed to help.

The Saviour had no vessel from which to drink, and so He asked the woman to give Him a drink from her pitcher.

A GEYSER

She was surprised at His request.

Jesus said that if she had known who it was that asked of her a drink, she would be glad to give it, and that she would ask of Him living water. This living water would be to the woman a well of water, springing up into everlasting life.

The good tidings that the gospel brings are like cool, life-giving water to a thirsty man. This gospel will quench our thirst and make us glad.

The gospel will be in our lives like a well of water, from which not only we, but others, may drink.

Pure water is always in motion, but if shut up to itself, it will become stagnant and impure. Just so with us. If we are selfish with our blessings, this water of life in our hearts will lose its sweetness and purity, and our lives will be unlovely and useless.

Spell and define—

pur′ i ty	pit′ ied	re quest′	quench
con′ stant ly	thirst′ y	tid′ ings	use′ less

Questions

1. Where in the Bible do you find the story of Jesus at the well of Samaria?
2. What did Jesus once say about giving a cup of cold water "in His name"? Matt. 10:42.
3. What do you understand this to mean?

Note Book Requirement

On page 24 copy some poem which you like, about water.

THE BOY AND THE BROOK

Down from yon distant mountain height
  The brooklet flows through the village street;
A boy comes forth to wash his hands;—
Washing, yes, washing, there he stands,
  In the water cool and sweet.

"Brook, from what mountain dost thou come?
  O my brooklet, cool and sweet!"
"I come from yon mountain, high and cold,
Where lieth the new snow on the old,
  And melts in the summer heat."

"Brook, to what river dost thou go?
  O my brooklet, cool and sweet!"
"I go to the river there below,
Where in bunches the violets grow,
  And the sun and shadow meet."

—*Henry W. Longfellow.*

CHAPTER V

DRY LAND

(Scripture Basis, Gen. 1: 9, 10)

"And God said, . . . Let the dry land appear."

Lesson XXVI

The Continents

His hands formed the dry land. Ps. 95: 5.

The land on the earth's surface was caused to appear at the commandment of the Creator.

The dry land is divided into great bodies called *continents.*

In order of size, beginning at the largest, the continents are Asia, Africa, North America, South America, Europe, and Australia.

A flat drawing of the earth's surface as it would appear to a person looking down from a balloon at a great

FRIGID North Pole BELT
TEMPERATE BELT
TORRID BELT
TEMPERATE BELT
FRIGID South Pole BELT
Tropic of Cancer
Equator
Tropic of Capricorn
Antarctic circle

FRIGID North Pole BELT
TEMPERATE BELT
TORRID BELT
TEMPERATE BELT
FRIGID South Pole BELT
Tropic of Cancer
Equator
Tropic of Capricorn
Antarctic Circle

height, showing the land and water shapes, is called a *map*.

The world is generally represented by a *globe* or by a map in two parts, one of which represents the Eastern Hemisphere and the other the Western Hemisphere. (The word *hemi* means "half." A *hemisphere* is half a sphere.)

Europe, Asia, Africa, and Australia are continents in the Eastern Hemisphere, and are known as the Old World.

The Western Hemisphere is known as the New World, and comprises the continents of North and South America.

Questions

1. Name the continents nearest the North Pole.
2. Name the continents nearest the South Pole.
3. Name the continents crossed by the Equator.
4. What continents have the most regular shores?
5. What the most irregular?
6. What continents are south of the Equator?
7. What continents are north of the Equator?
8. What continent is south of North America?
9. What continent is east of Europe?
10. What continent is west of Europe?
11. In what direction is Asia from North America?
12. What part of North America is the coldest?
13. What part of South America is the coldest?
14. What part of Asia is the warmest? Why?

Requirements

1. Locate each of the continents on the globe.
2. Upon which one do you live?
3. Locate the continents upon the map of the Eastern and Western Hemispheres.

Note Book Requirement

On page 27 write answers to all the questions asked in the lesson.

Lesson XXVII

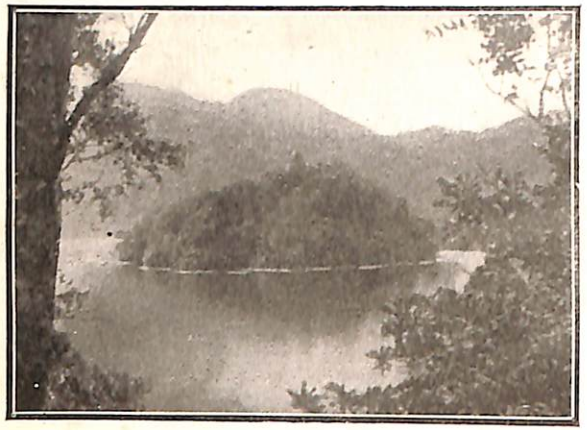
Islands

The isles shall wait for His law. Isa. 42: 4.

An island is a portion of land, smaller than a continent, entirely surrounded by water.

Islands often occur in groups. They may be very large or very small, and may or may not be inhabited.

Islands near continents are called *continental* islands. Islands far out in the ocean are called *oceanic* islands.



AN ISLAND

In the Pacific Ocean there are many groups of oceanic islands.

The Sandwich or Hawaiian Islands are in the Pacific Ocean north of the Equator. They are an interesting group.

Near the continent of Europe there is an important group of islands known as the British Isles. Here is the home of the English people.

The West Indies are a group of important islands near the continent of North America.

The East Indies are a group southeast of the continent of Asia. In this group are found New Guinea and Borneo, two of the largest islands in the world.

Greenland is a cold, dreary island, larger than either New Guinea or Borneo. It lies northeast of North America.

Newfoundland is a very foggy island lying just east of the continent of North America.

Madagascar is a large island lying east of southern Africa, in the Indian Ocean.

The islands of New Zealand lie south of the Equator, in the Pacific Ocean.

Japan is called the Island Empire. Here live the Japanese people.

Questions

1. What is an island?
2. What is a continental island?
3. What is an oceanic island?
4. Where are the Sandwich Islands? The British Isles? The West Indies? The East Indies?
5. Where is New Guinea? Borneo? Greenland? Newfoundland? Madagascar? New Zealand? Japan?
6. Which of these islands lie in the Hot Belt?
7. Which lie in the North Temperate Belt?
8. Which lie in the South Temperate Belt?
9. Are there any islands in the Cold Caps, north and south?
10. What does God do with the islands? Isa. 40: 15.

Note Book Requirements

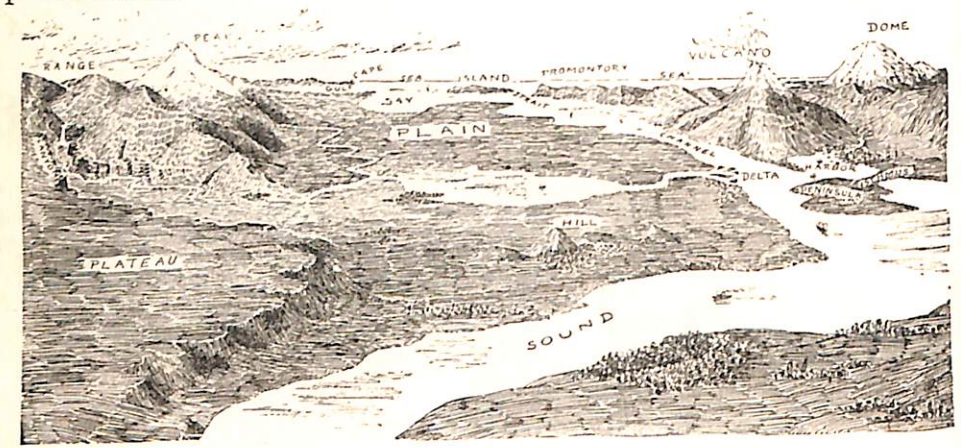
1. On page 28 print on the side of the map called east the word "East."
2. Print on the side of the map called west the word "West."
3. On the side of the map called north print "North."
4. On the side of the map called south print the word "South."
5. Show which is the Western Hemisphere and which is the Eastern by printing the names just below the circles.
6. Name the two continents of the Western Hemisphere.
7. With colored crayon color each of these grand divisions of land a different color.
8. Insert the names of oceans on both hemispheres.

9. Color the islands in both hemispheres, making each the same color as the continent to which it is nearest.
10. Name the following islands: Greenland, Borneo, New Guinea, Madagascar, Newfoundland, New Zealand, British Isles, Japan, Sandwich Islands.

Lesson XXVIII

Peninsulas

A peninsula is a portion of land almost surrounded by water. Europe, Asia, and North America have many peninsulas.



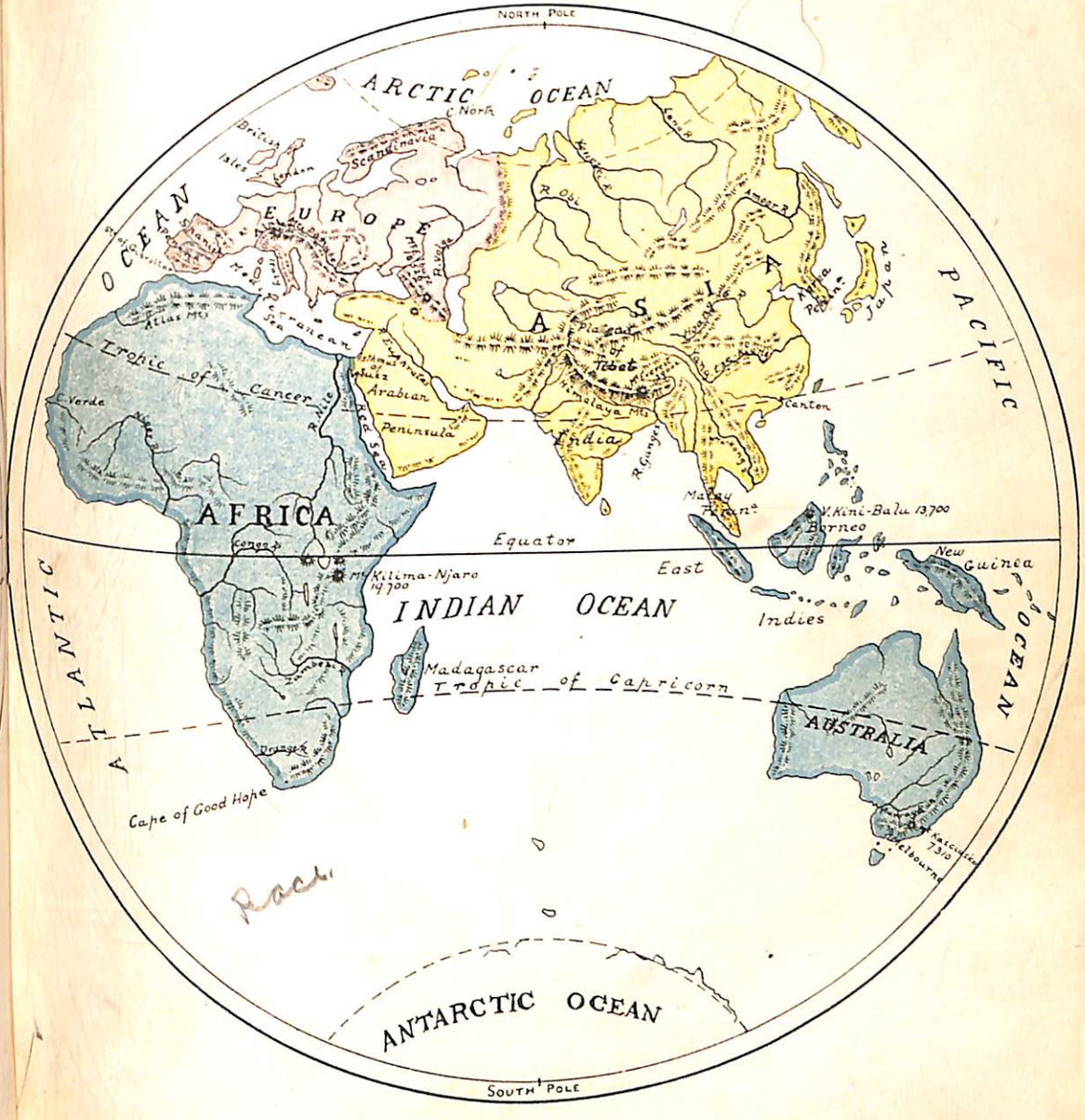
LAND FORMS

Arabia is the peninsula where the children of Israel wandered forty years before they entered Canaan.

Two other peninsulas of Asia are Malay and Korea. The Malay peninsula extends into the Indian Ocean, and is in the Hot Belt. Korea is in the North Temperate Belt.

Alaska, Labrador, Florida, and Lower California are peninsulas of North America.

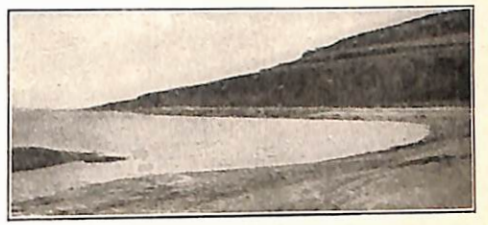
NORTH POLE
ARCTIC OCEAN
Bering Sea
Prince of Wales
Alaska
Davis Strait
C. Farewell
Labrador Penin.
Newfoundland
Columbia R.
NORTH AMERICA
C. Cod
New York
ATLANTIC OCEAN
PACIFIC OCEAN
Tropic of Cancer
Hawaiian Is
C. San Lucas
C. Sable
West Indies
Panama
Isthmus
Equator
C. Parina
C. Blanco
SOUTH AMERICA
C. San Roque
OCEANIA
Tropic of Capricorn
Mt Aconcagua 23,910 ft
C. Frio
Rio De la Plata
New Zealand
Cape Horn
ANTARCTIC OCEAN
SOUTH POLE


NORTH POLE
ARCTIC OCEAN
C. North
British Isles
London
Scandinavia
EUROPE
R. Obi
ASIA
Japan
PACIFIC OCEAN
Atlas Mts
Tropic of Cancer
C. Verde
Arabian Peninsula
Tibet
India
Canton
AFRICA
Equator
Mt Kilima-Njaro 19,700
East Indies
V. Kini-Balu 13,700
Borneo
New Guinea
INDIAN OCEAN
Madagascar
Tropic of Capricorn
AUSTRALIA
ATLANTIC OCEAN
Cape of Good Hope
Melbourne
ANTARCTIC OCEAN
SOUTH POLE

The Scandinavian peninsula is the home of the Swedes and the Norwegians.

The Spanish peninsula is made up of the two countries, Spain and Portugal.

The Italian peninsula, extending out from southern Europe, is in the shape of a boot. Here is the home of the Italian people.



A CAPE

Questions

1. In what climate belt are Alaska, Labrador, Florida, and Lower California?
2. Locate the Scandinavian peninsula on the map of Europe.
3. Locate the Spanish peninsula.
4. What two continents have no large peninsulas?
5. Name and locate four North American peninsulas; three European peninsulas; three Asiatic peninsulas.

Spell and pronounce—

pen in′ su la	Eu ro pe′ an	Ma′ lay	Span′ ish
Lab′ ra dor	A si at′ ic	A ra′ bi a	Por′ tu gal
Scan di na′ vi an	Ko re′ a	It′ a ly	Spain
Nor we′ gi an	Flor′ i da	A las′ ka	A mer′ i can

Lesson XXIX

Capes and Isthmuses

Jutting from the irregular coasts of continents, islands, and peninsulas, are many large points of land.

A point of land extending into the water is called a *cape*.

If the cape is high and rocky, it is called a *promontory*.

The extreme southern point of the continent of South America is known as Cape Horn. Ships that sail around Cape Horn sail farther south than is elsewhere necessary in going around any continent.

The Cape of Good Hope was so named by a European sailor who was in search of a way to India. The extent of the African continent was at that time unknown to the people of Europe, but when his vessel had rounded this cape, his hope was good for success in finding a road by sea from Europe to India.

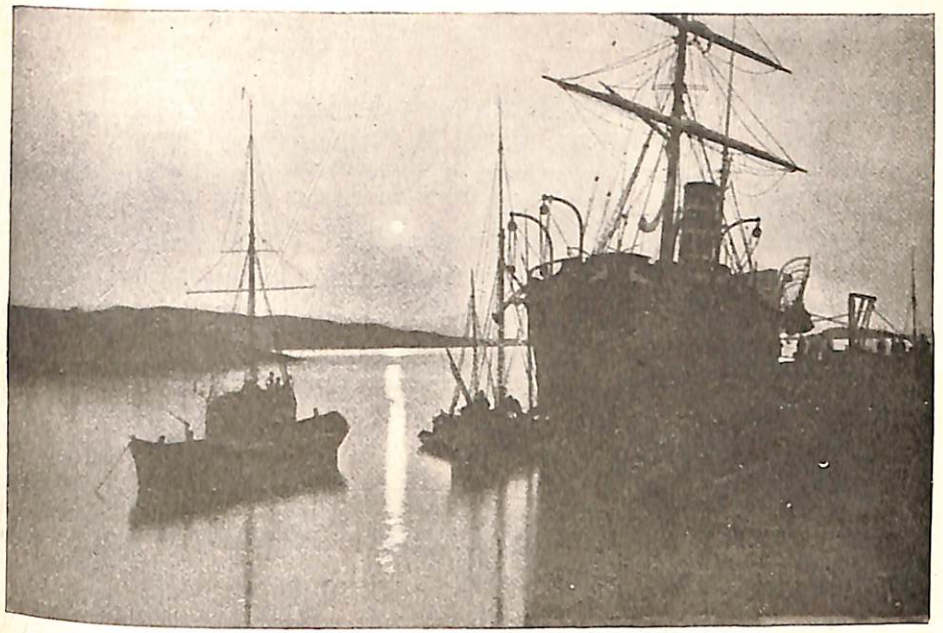
AN IRREGULAR COAST LINE

Cape North is the most northern point of Europe, and lies in the region of ice and snow. Here in the middle of summer the sun never sets, but lies low on the horizon at midnight.

East Cape and Cape Prince of Wales lie within the North Cold Cap. East Cape is the extreme eastern point of Asia, and Cape Prince of Wales extends from the extreme western coast of North America. These two capes are separated by the narrow waters of Bering Strait.

A narrow neck of water connecting two larger bodies of water is called a *strait*.

Any narrow neck of land connecting two larger portions of land is called an *isthmus*.



THE MIDNIGHT SUN

The continents of North and South America are connected by a strip of land so narrow that it takes but a few hours to go by rail from the Atlantic coast to the Pacific. This is the celebrated Isthmus of Panama, and across this isthmus men are now digging a canal which is to unite the waters of the Atlantic and the Pacific Ocean, and make a way for ships and great steamers to cross from one ocean to the other.

In the Old World there is a celebrated isthmus connecting Asia and Africa,—the Isthmus of Suez. A canal crosses this isthmus, making a way for ships to go from the Mediterranean to the Red Sea.

Questions

1. Locate the following capes of North America: Cape Farewell,

Cape San Lucas, Cape Cod, Cape Sable, Cape Prince of Wales.

2. Locate the following capes of South America: Cape Horn, Cape Blanco, Cape Parina, Cape St. Roque, Cape Frio.
3. Locate Cape Guardafui, Cape of Good Hope, and Cape Verde, of Africa.
4. Locate North Cape, of Europe; and East Cape, of Asia.
5. Trace three waterways from the Spanish peninsula to India, naming the bodies of water over which ships would sail on each route.
6. Find Bering Strait, Davis Strait, and the Strait of Gibraltar upon the map.

Note Book Requirements

1. On page 29 print the names of the hemispheres below the circles.
2. Show where the North and the South Pole are in both hemispheres.
3. Show the Equator in both hemispheres.
4. Find the Tropic of Cancer and the Tropic of Capricorn in both hemispheres.
5. Find the Arctic Circle and the Antarctic Circle in both hemispheres.
6. Locate all the capes mentioned in the lesson upon both hemispheres.
7. Locate all the peninsulas studied in the previous lesson.
8. Locate the Isthmus of Suez and the Isthmus of Panama.

Lesson XXX

Mountains

By His strength [He] setteth fast the mountains; being girded with power. Ps. 65: 6.

A *mountain* is a portion of land much higher than the land around it.

Several mountains joined together make a ridge, or chain, usually called a *mountain range.*

Several chains extending in the same direction make a *mountain system.*

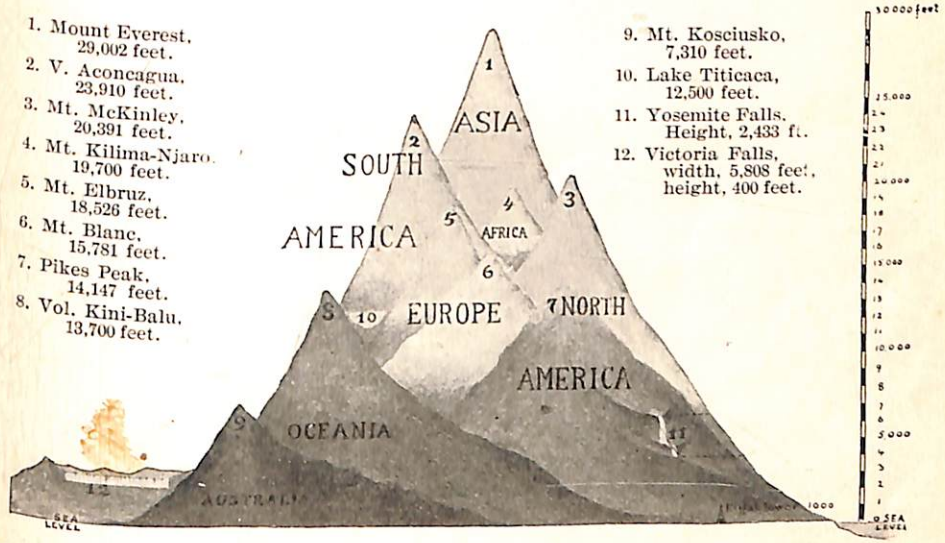
An elevation less than 1,000 feet is called a *hill.*

The top of a mountain is its *summit.*

The foot of a mountain is its *base.*

A mountain with a rounded summit is called a *dome.*

Mountains help to make the earth beautiful. They feed the rivers with water, and make the plains fertile below.



They protect countries from cold winds, and yield rich treasures for the use of man.

The longest mountain system in North America is the Rocky Mountains. Mount McKinley is the highest peak of this range.

The Rocky Mountains seem to continue through South America, but there they are called the Andes. Mount Aconcagua is the highest peak in that continent.

The Alps are the most celebrated mountains in Europe.

The loftiest peaks are always covered with snow. Wonderful ice rivers, called glaciers, fill the high valleys. Some of them are three miles wide and twenty miles long. Mount Elbruz in the Caucasus Range is the highest mountain peak of Europe.

The highest mountains in the world are in Asia. These are the Himalayas, the word meaning "home of the snows."

IN THE ROCKY MOUNTAINS

Mount Everest, in the Himalaya Mountains, is the highest peak in the world. It is more than five miles high.

Africa is walled in by mountains. Its highest peak is four miles high.

In Australia the mountains are not very high, but much gold is found in them.

Requirements

1. Bring to class a written question upon each paragraph.
2. Be able to locate all the mountain ranges and peaks mentioned in the lesson.

3. Be able to spell the names of all the mountains talked about.
4. Whose is the strength of the hills? Ps. 95: 4.
5. Of what are mountains a symbol? Ps. 125: 1, 2.
6. What mountains were connected with religious worship?

Lesson XXXI

Plains and Highlands

A *plain* is a wide region of land whose surface is nearly flat.

A *plateau* is a broad region of land, much higher than the surrounding country. It is usually bordered by mountains or cliffs.

A *cliff* is a nearly vertical slope that extends for some distance.

The great highlands are high, mountainous regions made up of a number of different mountain ranges, rugged mountain peaks, steep cliffs, and rough plateaus.

On the plains, one can see a long distance in all directions, and it is easy to travel almost anywhere, for the region is broad and flat.

In highland regions, travel is very difficult and often dangerous. The people usually travel on horseback. Railroads can follow only certain routes, for they can not be built in every direction, as on a plain.

The Rocky highland is the chief highland region of North America.

The Andes highland is the chief highland region of South America.

Tibet, in Asia, is the loftiest inhabited plateau in the world. In places it is three and a half miles high.

The chief highlands of both Europe and Asia extend across these continents from east to west, and like a great wall, protect the sunny lands of southern Europe and the

IN THE YOSEMITE VALLEY

hot plains of southern Asia from the bleak winds that sweep southward from the cold north.

The interior of Africa is a great plateau region, above which rise a few high mountain ranges.

Mountains border the eastern coast of the continent of Australia, also the southwestern and the northern coast.

Note Book Requirements

1. Name the continents and oceans.
2. Show the mountains, plateaus, and highland regions mentioned in the lesson.

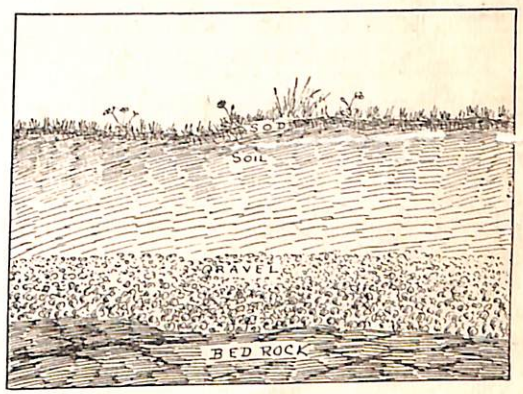
3. With green crayon show where the great plains are locate upon each of the continents.
4. Name the following: Equator, Tropic of Cancer, Tropic of Capricorn, Arctic Circle, Antarctic Circle.
5. Name the North Frigid and the South Frigid Zone.
6. Name the North Temperate Zone.
7. Name the South Temperate Zone.
8. Name the Torrid Zone.

Lesson XXXII

Soils

When God lifted the dry land above the waters, He intended to make it suitable as a home for man.

Beneath the earth's surface He laid massive rocks. These formed a solid and enduring foundation for the dry land.



Over this foundation were beds of coarse gravel and sand.

Above all, covering every kind of rock formation, the Creator spread a deep, rich soil.

Heat, cold, and water are constantly breaking up and loosening the soil.

On the slopes in mountainous regions the soil often slips away from the solid rock. These loosened particles of dirt are carried down by brooks and rivers to the valleys and plains below, and there make good soil for the farmer.

Where the soil is deep and loose, it is easy for the water to cut its way; and the winding river channel, ever broadening and deepening, leaves behind it jagged peaks and steep slopes.

In cold weather the water near the surface, by freezing in the cracks, breaks the rocks, just as a waterpipe or pitcher is broken by the freezing of water.

Plants force their roots down deep into earth's rocky bed, sometimes the very rocks themselves, splitting them apart; and worms and other animals, by tunneling in the ground, break up the soil and keep it loose.

Those soils that raise good crops are called *fertile soils*. Others are called *infertile*, or *barren*.

A sandy or gravelly soil is not as fertile as a dark, rich, loamy soil. Hence the soils of the valleys are more fertile than those of the rocky highlands.

Soils have to do with climate. Sandy or gravelly soils and all rocky surfaces are never warmed except through a few inches, and they give out their heat as soon as the sun goes down. Loamy and clayey soils take in more heat and give it up more slowly. For this reason sandy soils are much hotter during the day, but at night they are much cooler than loamy or clayey soils.

Questions

1. Of what did the Creator lay the earth's foundation?
2. Name five things that are constantly breaking up and loosening the soil.
3. What is meant by fertile soil?
4. What has soil to do with climate?
5. Why would a desert have cool nights in summer?

6. Why are the sands on the beach warmer at noon than the soil in the meadow?
7. Why are the beach sands so cool a few inches below the surface?

Lesson XXXIII

A Treasure-House

Beneath the earth's surface are hidden useful and precious substances for which man searches and digs.

ENTRANCE TO A COAL MINE

Gold, silver, and copper are taken from the earth's treasure-vaults.

Iron, from which are made nails, knives, stoves, and many kinds of tools, is found by digging into the earth.

Coal, from which we get heat, is also dug from the ground.

Lead and tin are other treasures found away down under the ground.

Precious stones, among which are diamonds, rubies, emeralds, and opals, are among the treasures of earth.

On every continent are stored up these treasures, without which man could not well live. In one place is found

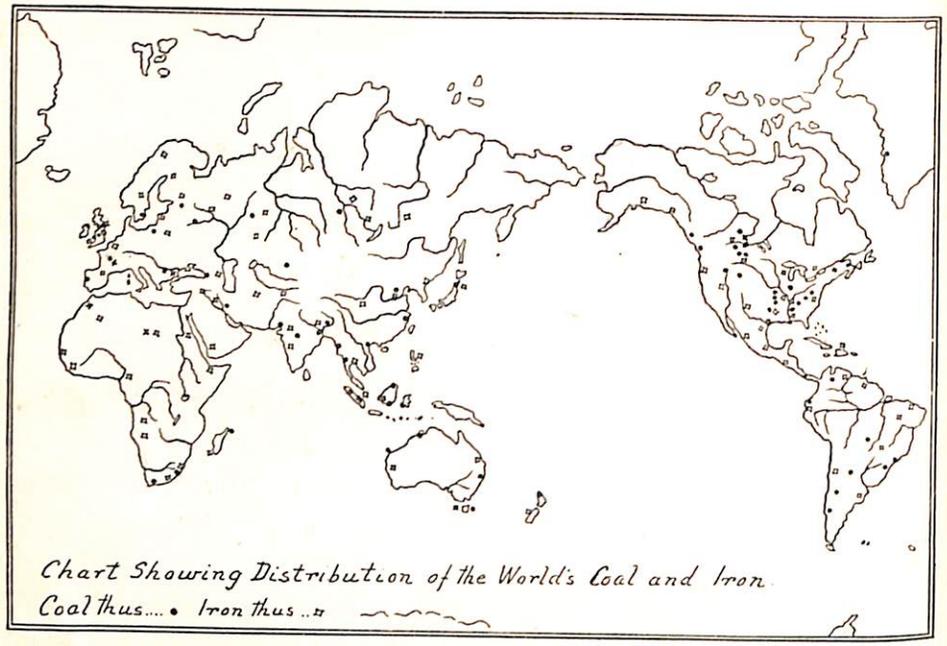


Chart Showing Distribution of the World's Coal and Iron
Coal thus.... • Iron thus ..¤

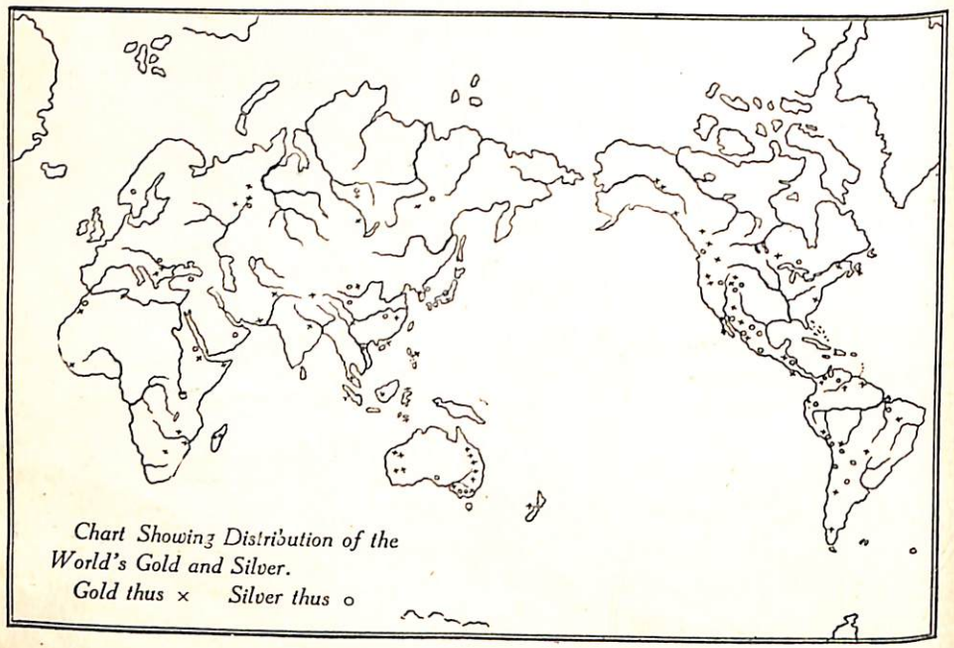
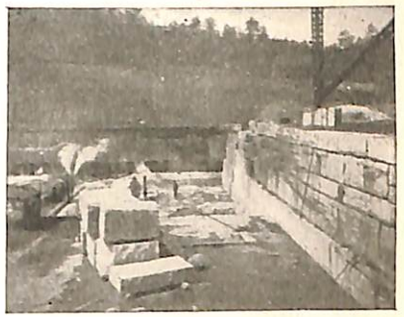


Chart Showing Distribution of the World's Gold and Silver.
Gold thus × Silver thus o

one treasure, in another place another treasure abounds.

The work of taking these treasures from the earth is called *mining*. Mining is an important occupation.



A MARBLE QUARRY

Clay is taken from the earth, and used by potters in making dishes, pipes, and other pottery.

Limestone and other rocks are taken from the earth, and used for building purposes.

Quarrying is the name given to the work of cutting the rocks from the earth. This, too, is an important occupation.

Have you ever visited a mine? If not, ask your teacher to tell you what you might expect to see on such a visit.

Note Book Requirement

On pages 33 and 34 write a story describing your visit to a mine or a visit to a quarry.

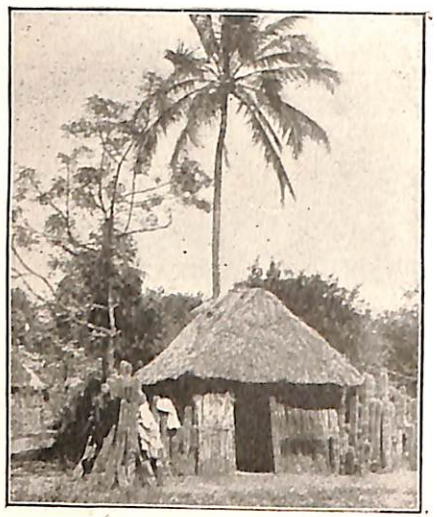
Lesson XXXIV

Homes of Men

Thus saith the Lord that created the heavens; God Himself that formed the earth and made it; He hath established it, He created it not in vain, He formed it to be inhabited: I am the Lord; and there is none else. Isa. 45: 18.

Upon each of the six continents, and upon the islands of the sea, live vast numbers of men, women, and children. There are more than fifteen hundred million people in the world.

As a shelter from rain, snow, cold, and heat, men build houses, which they furnish as homes for themselves and their families. Here they live, eating, sleeping, working, and spending their time as they choose.



NATIVE HOME IN CENTRAL AMERICA

Not all houses are like the stone, brick, or wood structures which we know.

In very cold countries, men build their houses of snow and ice. The natives of these countries think themselves quite comfortable in their sparkling white *igloos*.

Some people make homes in holes dug in the ground. Some live in houses made of skins, cloth, or bark. Others live in houses of grass.

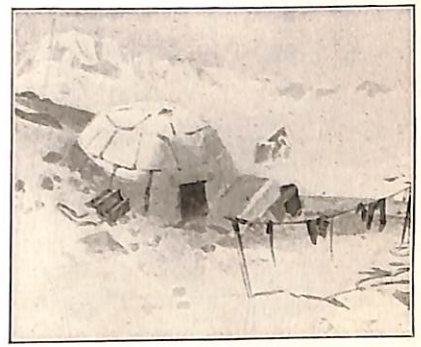
A few houses in one place form a *village* or *hamlet*. Many houses grouped together make a *town*.

When many hundreds of houses are grouped together in a small area, a large town or *city* is formed.

More than half of the people in the world live in Asia. Here are the Chinese and other yellow-skinned people. They have many large cities.

INDIAN WIGWAM

Although Europe is next to the smallest continent in size, it contains more people than any other continent except Asia. London, the capital of Great Britain, is the largest city in the world.



A HOME IN THE LAND OF ICE AND SNOW

The continent of Africa has been called the Dark Continent, and is the home of the black people. They group themselves in tribes, and rove from place to place. They have not many large cities. Africa is the third continent in population.

North America numbers fourth in population. New York is its largest city, and is next in size to London.

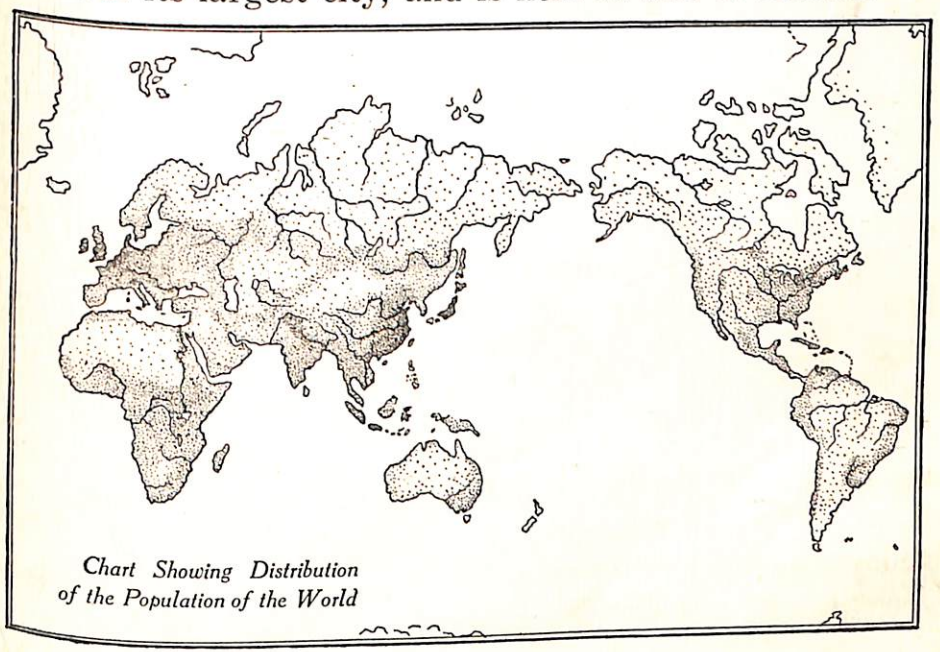


Chart Showing Distribution of the Population of the World

The people of South America number only about one third as many as those in North America. South America has a few large cities, Buenos Ayres being the largest.

Australia, the smallest of the continents, contains the homes of more than three millions of people. Melbourne is the largest city of this island continent.

Questions

1. Why is Australia called an "island continent"?
2. Name and locate the chief cities of each continent.
3. Name the continents in order of the density of their population.
4. What is the meaning of the word *population?*
5. In what climate belts do you find the most dense population?
6. In what hemispheres?

Lesson XXXV

Cities and Commerce

They that go down to the sea in ships, that do business in great waters; these see the works of the Lord, and His wonders in the deep. Ps. 107: 23, 24.

Large cities are usually built as the result of trade.

The business of exchanging goods, or buying and selling them for money, is called *commerce.*

Imports are goods brought into a country, and *exports* are goods sent out of a country.

When goods are sent out from one country to another, the business is called *foreign* commerce.

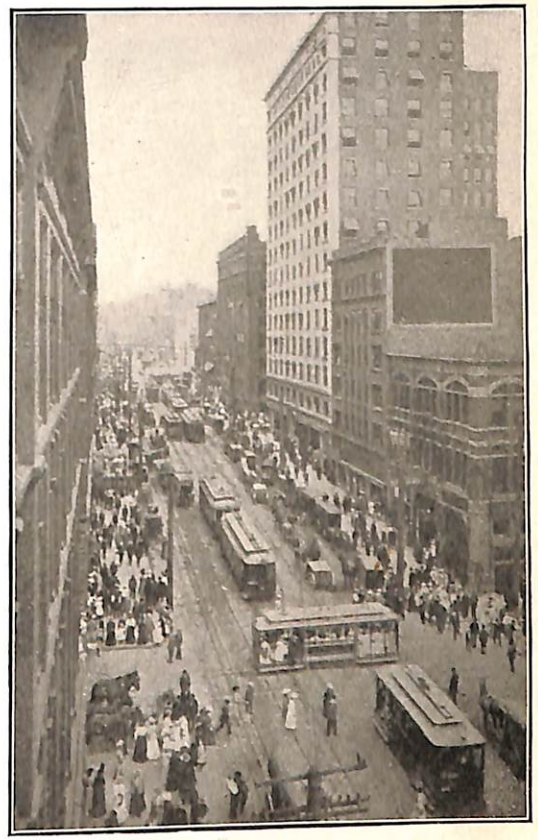
Sea-coast cities that have good harbors are centers of trade, and from these cities commerce with different countries is carried on.

In these commercial cities, large numbers of merchants

are occupied in buying and selling, and large numbers of people are employed in the work of exchanging exports for imports.

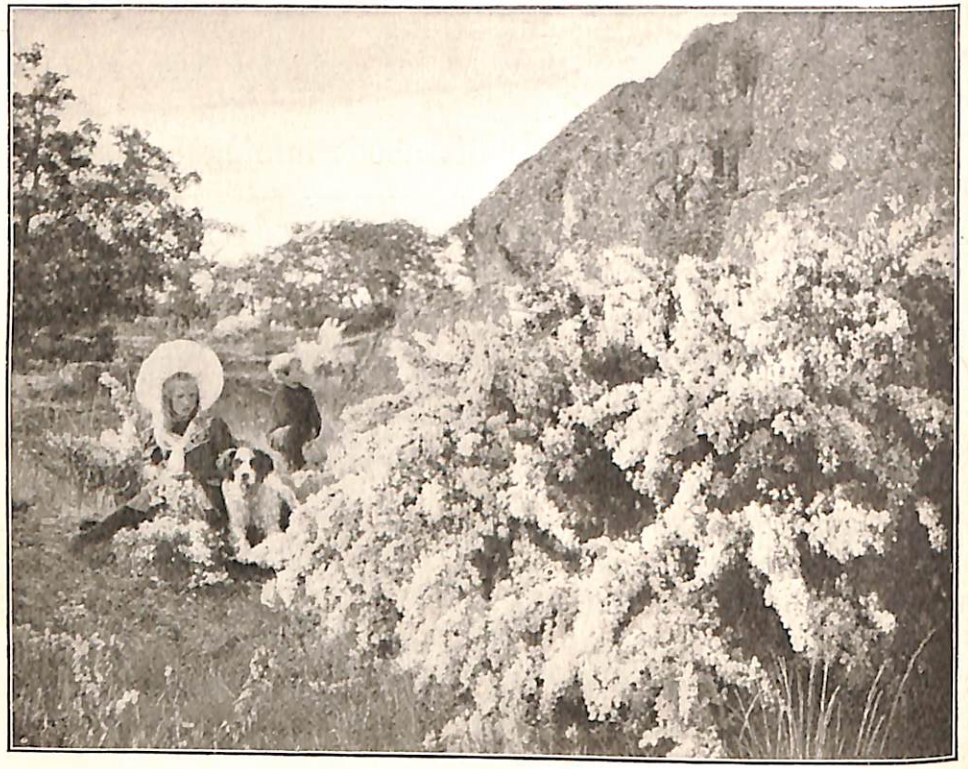
Large cities are also built about mining and manufacturing centers.

In large towns and cities there are so many houses and they are built so close together that few people can look off to the rolling hills or level fields. For blocks and blocks, the tall buildings, separated only by paved streets and sidewalks, are crowded together, with only an occasional plot of ground on which grow trees and shrubbery.



IN THE CITY

In the country, every child knows where to find blossoms in the spring and nut trees in the fall. He can visit the little creatures in their homes in the woods. From all the things of nature the country child learns many lessons about which the city child can only be told, if he learns at all; for in the crowded city there is little opportunity to study God's beautiful handiwork.



IN THE COUNTRY

Much unhappiness, sin, and misery exist in large cities. Among the poorer classes of people there is much suffering and want. Here the rich become very rich, and the poor become very poor. We learn from God's word that this condition is to increase in the last days. James 5: 1-6.

The message of salvation must be given in the large cities before they are visited in judgment, for in the cities are honest souls who are longing for a better life.

In the Bible we read of a city which shall descend to this earth and become its capital. The glory of this celestial city far exceeds that of any earthly city ever built by man.

Questions

1. Do you live in the country or in the city?
2. Why are the inhabitants of great cities more liable to be ungodly than the inhabitants of the country?
3. What lesson concerning living in wicked cities has been recorded in the Bible? Gen. 19: 12-29.
4. What do you know about the New Jerusalem?

Note Book Requirements

1. On page 31 show with orange crayon where gold is found.
2. With yellow crayon where silver is abundant.
3. With brown crayon where iron is found.
4. Name continents and oceans.
5. Name important gulfs, bays, and seas whose names you have learned in your study thus far.

Lesson XXXVI

Government

Put them in mind to be subject to principalities and powers, to obey magistrates, to be ready to every good work. Titus 3: 1.

Government is the fixed rules under which people live together.

The simplest form of government is that in the *family;* and although the rules may not be written out, they are just as much rules as if they were put in writing or printed in a book.

PRESIDENT ROOSEVELT

People dwelling in the same land, speaking the same language, live together under certain fixed rules that make the *civil government* of the country.

All countries do not have the same form of civil government.

Generally, civil governments are old. The rules, or laws, were made long ago. In the first place, they were laid down by some king or conqueror. Other kings coming after may have changed or added to them.

KING EDWARD VII.

Sometimes it happens that the people do not like to have kings make rules for them. In such cases the people may overthrow all the rules under which they have been living, and make an entirely new set of rules.

A government in which the people have a part in choosing persons to make their laws and carry them out, is called a *republic*. The chief officer is called a *president*.

A country governed by a king or a queen is called a *kingdom*. Such a government is monarchical in form.

A government where the will of the ruler is absolute, is despotic in form. A despotism may be either moderate or crushing in its rule.

CZAR NICHOLAS II.

The city where the laws of a country are made is called the *capital*.

Each city, state, territory, or province of a country usually has a government of its own, and yet all are under the general government of that particular country.

Governments are necessary. They are "ordained of

God." Rom. 13: 1. Without them, disorderly people would make it very unpleasant for those who desire to live quietly. Bad men would constantly steal property and kill people, if there were no government.

BRITISH PARLIAMENT BUILDING

The foundation of God's government is His law. This law will never be changed, but will be the rule under which men not only live now, but the redeemed will be subject to it in the new earth.

Questions

1. What is meant by a republican form of government?
2. A monarchical form?
3. A despotic form?
4. On what continents do you find a republican form of government?
5. A monarchical form?
6. A despotic government?
7. What countries do the three rulers pictured in your lesson govern?

Note Book Requirements

1. On page 32 name all the continents and oceans.
2. Show with black shading the parts of the earth that are ruled by a despotic form of government.
3. Show with red crayon where a monarchical form of government exists.
4. Leave white such portions of land as are under a republican form of government.
5. Locate upon this map all the important cities that have been mentioned in past lessons.

Lesson XXXVII

Money

Money answereth all things. Eccl. 10: 19.

Money is a convenient means of exchange in trade.

Coin is usually made of silver or gold, but anything having a fixed value may be used as money.

Anciently, iron was used as money. At one time wooden money was used in Rome, and leather money in France.

Shells and beads are used as money by savages and natives of some oceanic islands.

The natives of New Guinea use sticks of tobacco for money. With a certain number of sticks they can purchase a hatchet, a knife, or a fish-net.

The government of each country decides upon its own kind of money. Paper may be stamped by the government with a fixed value, and pass as money.

Money made and stamped by others than the government is *counterfeit* money. To use such money knowingly is a crime, and those who make and circulate it are sent to prison.

The first mention of money is in the Bible (Gen. 23: 9), where is given the story of a man who bought a grave in which to bury his wife.

We learn that "the *love* of money is the root of all evil," but those who have money can do much good by helping the poor and needy. This is much wiser than to hoard it up where it can benefit no one. "He that hath pity upon the poor lendeth unto the Lord." Prov. 19: 17.

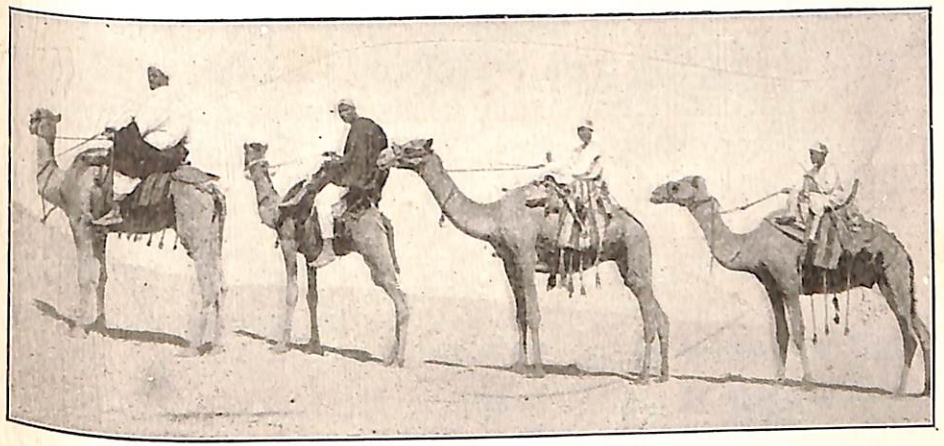
Questions

1. To whom does all the wealth in the world belong? Ps. 50: 10.
2. Does God wish us to worry over financial matters? Matt. 6: 25.
3. What does He say about debts? Rom. 13: 8.

Lesson XXXVIII

Means of Transportation

But thou, O Daniel, shut up the words, and seal the book, even to the time of the end: many shall run to and fro, and knowledge shall be increased. Dan. 12: 4.

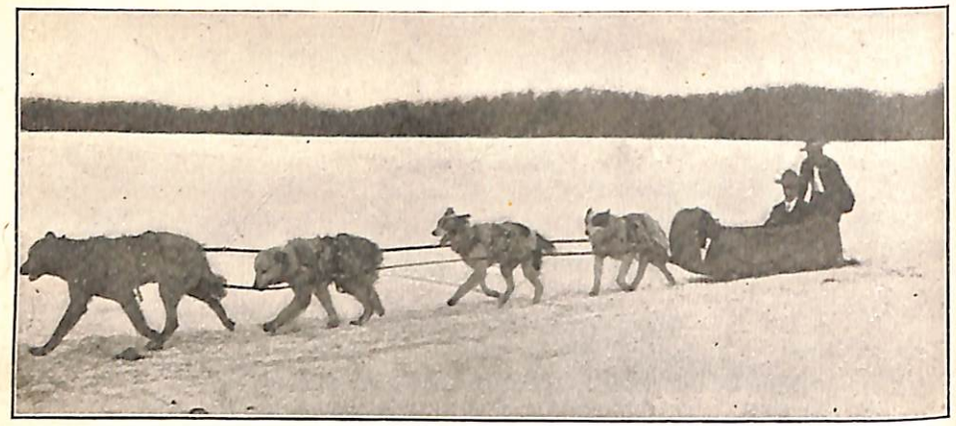


TRANSPORTATION IN THE DESERT

When goods are carried from one place to another, we say they are *transported.*

Transportation is necessary in carrying on commerce, both foreign and domestic.

Anciently, goods were transported with difficulty from one place to another.



TRANSPORTATION IN THE FAR NORTH

In some countries beasts of burden are employed to carry merchandise from one place to another, but since the introduction of railroads, goods may be moved rapidly and easily across the continent. It was not until 1827 that railroads of considerable length and for public use were built.

The invention of steamboats has done much to help commerce. The very first successful steamboat in the world was invented by John Fitch in 1790.

TRANSPORTATION IN OLDEN TIME AND NOW

Since then, all large lakes and navigable rivers are of much use to commerce.

Canals are waterways made by man to assist in the transportation of goods, and are of much importance.

Rapid means of transportation are of assistance to those who are interested in finishing the work of God in the earth.

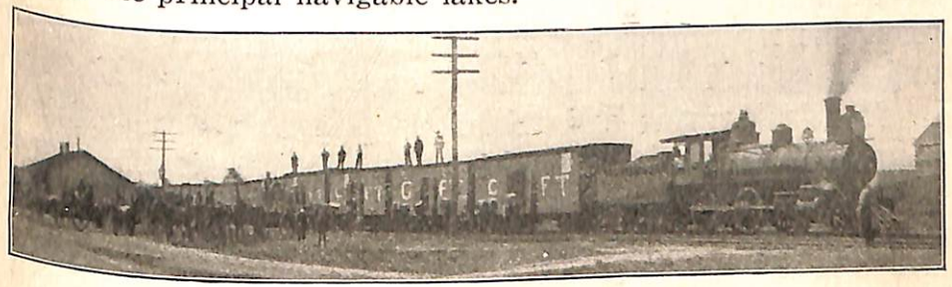
The Bible says, "Many shall run to and fro, and knowledge shall be increased." This is a sign of the "time of the end."

As soon as "this gospel of the kingdom" is preached in all the world as a witness, "then shall the end come."

WATER TRANSPORTATION

Questions

1. When was the first railroad built?
2. When was the first steamboat invented?
3. Are there any railroads near your home?
4. What places do they connect?
5. Are there any navigable rivers or lakes in your State?
6. Tell all you can of the principal navigable rivers of your continent.
7. Of the principal navigable lakes.



TRANSPORTATION ACROSS THE CONTINENT

Lesson XXXIX

Means of Communication

Canst thou send lightnings, that they may go, and say unto thee, Here we are? Job 38:35.

By means of railroads and steamships, distant cities are united, and messages by letter may be sent from place to place.

Post-offices are established all over the world for forwarding papers and letters. Many people are employed in the handling and delivering of mail in these government offices.

Suppose, however, we wish to communicate quickly with a friend many miles away. We have a message of great importance. We could send such a message by telegraph. A message sent by telegraph is called a *telegram*.

Telephone messages are sent short distances, and even long distances sometimes, over the telephone wires. In a telephone message the voice of the speaker can be heard and recognized miles and miles away.

Both telegrams and telephone messages are sent by means of *electricity*, one of the powerful forces of nature which man has learned to use.

Messages may be sent by means of telegraph wires, not only across continents, but across oceans as well. Does

this seem impossible? Telegraph wires called *cables* are laid on the bed of the ocean, and thus news can go quickly from one hemisphere to another.

It was in 1866 that the first ocean cable was successfully laid across the Atlantic Ocean.

The telegraph wires in the United States alone are sufficient to reach ten times around the earth.

The excellent mail service, and the rapidity with which news can be sent from place to place, make the spread of the third angel's message easy.

The Lord has promised to do a short work in the earth. Publications bearing the last message of mercy to the world are to be scattered like autumn leaves in every place.

Requirement

Make sentences containing the following words:

tel′ e phone	mes′ sage	es-tab′ lish ed	gov′ ern ment
tel′ e graph	ca′ ble	pub li ca′ tion	tel′ e gram

Lesson XL

A Continent

North America includes about one sixth of all the dry land on the globe, and is the third continent in size.

Could we measure the many windings of its irregular coast line, we should find that it is almost as long as the entire distance around the earth.

This map suggests a broad stretch of country, so broad, in fact, that it would take a fast railroad train more than five days and nights to carry you across it from east to west.

NAVIGATION ON THE OHIO

The lines that represent rivers upon the map suggest broad streams of flowing water, upon the largest of which steamboats and sailing-ships are constantly passing, and across which men have built immense bridges.

The greater part of North America is made up of plains. A great central valley extends from north to south between highlands and long mountain ranges.

The large river system occupying the southern part of this great plain, is the Mississippi. Taking the Missouri and the Mississippi below the mouth of the Missouri together, they form the longest river in the world.

A BUSY WATER-FRONT

The great system of mountains that stretches north and south along the western coast, is known as the Rocky Mountain Highlands. This is a vast, rugged region, above which rise snow-crowned peaks. Here are the beginnings of the mighty rivers that flow through the fertile plains below.

Among these mountains, and among the mountains of the Appalachian system in the East, lie vast fields of coal and other minerals. Here the miners are busy digging for the precious hidden treasures of the earth.

The larger part of North America lies in the great North Temperate Belt of the globe. For this reason, and because it is so well watered, it is rich in food products, and farming is one of its chief industries.

IN THE HEART OF THE ALLEGHANIES

The navigable rivers and the large lakes of North America furnish splendid natural advantages for domestic commerce.

The excellent harbors along the eastern, western, and southern coasts invite foreign vessels to our shores; and in exchange for the products and manufactured articles of other countries, we export the treasures of our own continent.

Questions

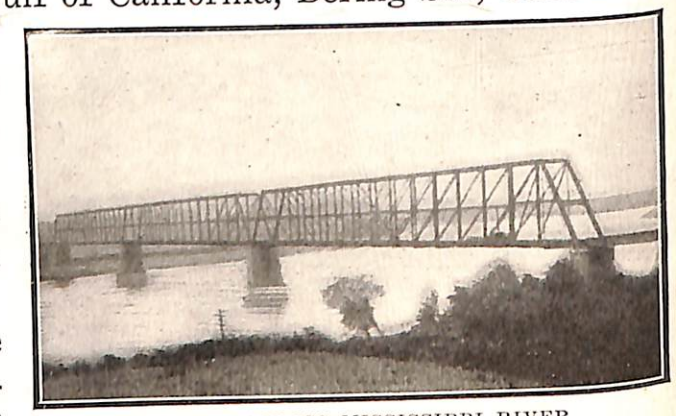
1. Is this large drawing a picture of the continent on which you live?
2. By what name is this continent known?
3. What kind of surface does the map suggest to you,—a broad, open country, or a mountainous one?

4. What do the crooked lines represent?
5. What forms the longest river in the world?
6. What mountain systems are there?
7. State the chief advantages of North America.

Lesson XLI

Map Questions

1. What is the general shape of North America?
2. What oceans wash its shores?
3. Find the following great ocean arms: Hudson Bay, Gulf of Mexico, Gulf of California, Bering Sea, Caribbean Sea, Davis Strait.
4. Locate the Rocky Mountains.
5. Where are the Appalachian Mountains?
6. Where are the Sierra Nevada Mountains?



BRIDGE ACROSS MISSISSIPPI RIVER

7. Where is the Cascade Range?
8. Where is Mount Whitney? Pikes Peak? Mount Shasta? Mount Hood? Mount Rainier? Mount McKinley? Mount Popocatepetl?
9. Locate the following peninsulas: Alaska, Labrador, Florida, Lower California.
10. Where are the following islands: Cuba, Hayti, Greenland, Baffin-Land?

11. Where does the Mississippi River rise, and into what body of water does it empty? Name its largest branches.
12. Describe the following rivers: Colorado, Columbia, Yukon, Mackenzie, Saskatchewan, St. Lawrence, Rio Grande.
13. Name the five Great Lakes. Which is the largest?
14. Locate Great Salt Lake, Great Slave Lake, and Great Bear Lake.
15. Find Cape San Lucas, Cape Sable, Cape Race, Cape Prince of Wales, Cape Barrow, Cape Cod, Cape Hatteras, Cape Catoche.
16. Into what ocean does each of the capes above mentioned extend?
17. Locate the Isthmus of Panama.
18. What is the highest mountain peak of your continent?

Note Book Requirements

1. On page 35 trace the dotted outline of North America with ink, making an unbroken line of it.
2. Where are Asia and South America?
3. Name the oceans that bound North America.
4. Locate the Gulf of Mexico; the Caribbean Sea; Baffin Bay; Hudson Bay; Bering Sea; Gulf of California; Gulf of St. Lawrence.
5. Name the Great Lakes.
6. Insert upon the map the names of all the straits mentioned in the lesson.
7. Show where the principal mountain ranges are found.
8. Trace the islands surrounding North America, and name them.
9. Trace and name the principal rivers.
10. Show the zones in which North America lies.

Lesson XLII

Political North America

Here is another map of North America. Such a map is called a political map, because it pictures the divisions of the continent into countries.

A physical map pictures the highlands and the lowlands, the mountain chains and the river systems. All such natural features are well shown upon a physical map of the continent. Upon this map are shown the political divisions of the country.

Rivers, lakes, and mountains often serve as boundary lines between countries and states; but it is man, and not nature, that decides how much of the continent's surface shall be included in any single political division.

MOUNT McKINLEY

Stretching across the middle of the great continent of North America, we find the political division known as the United States. The capital of this broad division is the city of Washington. Here the President and the chief officers of the government live and do business.

Washington is a beautiful city, although it is not so large as some other cities of the United States.

New York is the metropolis of this country; in fact,

ARCTIC OCEAN
GREENLAND
Baffin Bay
Davis Strait
Baffin Land
Arctic Circle
Hudson Strait
Hudson Bay
Port Churchill
DOMINION OF CANADA
Athabasca
Saskatchewan
Manitoba
Assiniboia
Ontario
Quebec
Labrador
Newfoundland
Cape Breton I
C Sable
Cape Cod
Wilmington
Charleston
Bermudas
ATLANTIC OCEAN
ASIA
BERING SEA
Bering Strait
C Barrow
ALASKA
Vancouver Island
Victoria
Seattle
Olympia
Columbia
Portland
Salem
Los Angeles
San Diego
PACIFIC OCEAN
UNITED STATES
Arizona
New Mexico
Texas
Austin
Galveston
New Orleans
GULF OF MEXICO
Tropic of Cancer
C San Lucas
MEXICO
Tampico
Gulf of Campeachy
Campeachy
Acapulco
CENTRAL AMERICA
CUBA
Havana
Jamaica
Kingston
CARRIBEAN SEA
Honduras
Mosquito
Reservation
Scale of English Statute Miles
69.164 = 1 Degree.
G.A.H.
15,000 ft
10,000 ft
5,000 ft
Sea Level
5,000 ft
10,000 ft
Coast Range
Cascade Mts
Mt Shasta 14,513
Wasatch Mts
Rocky Mts
Longs Peak 14,271
Missouri River
Mississippi River
Ohio River
Appalachian Mts
Delaware Bay
Sea Level

B. N. S. No. 1—102

it is the largest city on our hemisphere. Here more than four million people live. There is but one city in the world larger than New York. Do you remember of what country this larger city is the capital?

The Dominion of Canada, lying north of the United States, reaches across the continent from ocean to ocean. All of this northern region, except Alaska and Greenland, belongs to Great Britain. The king of England appoints the chief ruler, who is called the governor-general. Ottawa is the capital of the Dominion. Montreal is the largest city. Halifax is the chief harbor on the Atlantic coast. Vancouver, on the Pacific coast, has an oceanic commerce.

Alaska belongs to the United States. It was bought from Russia in 1867. It lies in the Cold Cap of North America, but is a valuable region because of its mineral wealth. It is famous for its glaciers and ice-covered seas. Mount McKinley, the highest mountain in North America, is in Alaska.

Greenland is a mountainous island lying in the North Cold Cap. Most of its surface is covered with glaciers. The island is under the rule of Denmark, a kingdom of Europe.

Mexico is the most important country of southern North America. It is about one fourth the size of the United States. Its capital is the City of Mexico, and its government is now a republic, although at one time Mexico belonged to the kingdom of Spain.

Central America is the name given to six small republics and a small British possession, lying in the Hot Belt. The larger number of people are Indians and Negroes. At the present time the United States has a great interest

in this region, because of the canal which is being dug from the Atlantic to the Pacific, across the Isthmus of Panama.

The West Indies are a group of large and small islands between the Atlantic Ocean and the Caribbean Sea. Cuba, the largest island in the group, became an independent country in 1902. Havana is the most important city in Cuba.

Questions

1. What does a political map picture?
2. A physical map?
3. What physical features often serve as boundary lines between states and countries?
4. Who decides the boundaries of nations? Acts 17 : 26.
5. Name the political divisions of North America.
6. Name the capital and the largest city of each.
7. Name two important harbors of each country.
8. Which countries of North America are republics?
9. In what climate belt does each country of North America lie?
10. Bound each country of the continent.

Note Book Requirements

1. On page 36 trace the dotted outline of North America, also islands and rivers.
2. Trace the northern and southern boundaries of the United States, and insert its name.
3. Trace the boundaries of Mexico and Central America and show the name of each.
4. Color the land on your map with colored crayon, showing each country in a different color.
5. Show to whom Alaska belongs.
6. Show to whom the continental islands belong.
7. Name and locate the capital of each of the countries of North America.
8. Name and locate any other cities with which you are familiar.

Lesson XLIII

The United States

Do you live in the United States? We have already studied its position on the continent of North America, and have noticed its broad extent, and heard the names of a few of its cities.

If your home is in the United States, you will be interested, at this point, in taking a trip through this country; and if your home is elsewhere, you may also be interested in this imaginary journey; for the United States is rightly considered a very important part of the earth. In fact, so important is the part that this country is to act in the closing of the last message of mercy to our world, that it is spoken of, and the work that it will do is described, in God's holy word.

STATUE OF LIBERTY, NEW YORK

A few hundred years ago a trip across the region now occupied by the United States would have been a very big undertaking, although it would not have been without interest. On the plains, in dense forests, along the banks of broad, flowing rivers, lived in those days our red brothers, the Indians. There were many wild animals in the mountains, and fish were abundant in the lakes and rivers; but the riches of the soil, both in plain and highland, had never been dreamed of. Railroads? they had never been thought of at that time.

The few white people who had come from Europe to the coast of this New World, lived in scattered settlements

along the Atlantic coast, and it was with great difficulty that they made their way across the Appalachian Highlands into the Mississippi Valley. There were no roads nor convenient means of travel. There was no mail service, much less any telegraphic communication with their friends who were left behind.

Now look at the network of railroads that cross the country from east to west! Look at the cities that dot the

THE FIRST SANTA FE TRAIN

land! Look at the harbors that line the coast! From a small beginning the United States has grown into a large country. From thirteen States it has grown to include forty-eight States and three Territories.

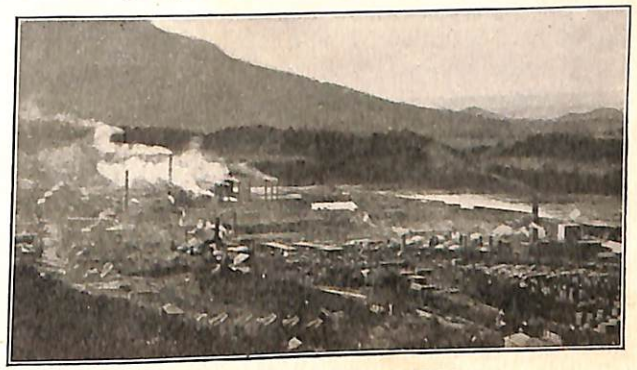
Territories are large areas so thinly settled that there are not people enough to form a State. Alaska is a Territory. The Hawaiian Islands, in the Pacific Ocean, form another Territory. The President of the United States appoints the governors of Territories, while the people elect the governor of a State.

The United States owns large islands in different parts of the world. Porto Rico in the West Indies, and the Philippines in the Pacific, now belong to this country.

A COUNTRY SAWMILL

In the early times every family produced most of the food and clothing that were needed at home, and few things had to be bought. But as the country developed, certain regions were found better for agriculture than for any other occupation. Other regions were better for grazing, and still others were better for manufacturing.

Some regions are devoted particularly to mining, because of their mineral wealth. Still others are rich in lumber, and the people devote more time to lumbering than to agriculture or mining. An abundance of fish in rivers or on the coast lead the people in such regions to devote their time to *fishing*.



A MANUFACTURING TOWN

As a result of so much attention to a single industry, the people of one region find it necessary to ex-

change their products for the products of other places. This makes commerce large, and goods are sent by train or boat from one part of the United States to every other part.

In addition to its domestic commerce, the foreign commerce of the United States is very great. Along the seacoast large cities have grown up, and the occupation of the larger number of people in such regions is commerce.

Questions

1. Describe the position of the United States upon the continent of North America.
2. What can you say of the importance of the United States as a country?
3. Describe a trip through the region now occupied by the United States before the white man came to this continent.
4. Who lived upon this continent at that time?
5. What was their occupation?
6. From what continent did the white people come to the New World?
7. What can you say of those early settlements?
8. How many States were there in the United States at first?
9. How many are there now?
10. What is the difference between a State and a Territory?
11. What groups of islands in the Pacific Ocean belong to the United States?
12. What islands in the Atlantic now belong to the United States?
13. Name seven important occupations of the people in this country.
14. What is meant by domestic commerce? Foreign commerce?
15. Tell in what State each of the large cities you have located upon your map is found.

Note Book Requirements

1. Trace the coast line of the map of the United States found on page 37.
2. What country is north? south?

3. What ocean east? west?
4. Name the gulf south.
5. Trace all the rivers shown in the map, and name.
6. Trace and name the Great Lakes.
7. Show the Rocky Mountains, Cascade Mountains, Sierra Nevada Mountains, and Appalachian Mountains.
8. Insert the boundaries and show the names of all the States and Territories.
9. Locate and name the capital of each State.
10. Locate upon the map the following cities: Washington, D. C., New York, Chicago, Philadelphia, St. Louis, Boston, Baltimore, Buffalo, Cincinnati, Cleveland, Pittsburg, San Francisco, Portland, Seattle.

Lesson XLIV

My State

1. In what State do I live?
2. What is its size?
3. What is its population?
4. What is the State capital?
5. What is the ruler of a State called?
6. Who is the present governor?
7. Into how many counties is the State divided?
8. Bound the State.
9. What is the largest city?
10. Where are its State schools located?
11. In what climate belt does it lie?
12. What are its principal industries?
13. What are its products?
14. What are its principal exports?
15. What are its principal imports?

16. How far is it from the coast?
17. Across what States would it be necessary for me to travel to reach the Atlantic coast? To reach the Pacific coast?

Note Book Requirement

On page 38 draw a map of your State, locating the rivers, mountains, and principal cities.

Lesson XLV

My County

1. In what county do I live?
2. Into how many school districts is the county divided?
3. What is the population of the county? —
4. What is the county seat?
5. What is the climate of the county?
6. What is its surface?
7. What are its boundaries?
8. What is the principal occupation of most of its people?
9. What are its products?
10. What are its exports?

Note Book Requirement

On page 38 draw a map of your county, locating the rivers, mountains, county seat, and your own town or village.

CHAPTER VI

PLANTS

(Scripture Basis, Gen. 1: 11, 12)

"And God said, Let the earth bring forth grass, the herb . . . and the fruit tree."

Lesson XLVI

The Creation of Plants

God said, Let the earth bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth: and it was so. Gen. 1: 11.

1. Upon what day did the world bring forth the very first plants?
2. How were plants created? Gen. 1: 11.
3. Of what were the plants made? Gen. 2: 9.
4. What three classes of plants did God create?
5. Name grasses with which you are familiar.
6. Give examples of familiar herbs.
7. Name trees with which you are acquainted.

AMONG ROSES

8. What was one purpose for which God created plants? Gen. 1: 30.

9. What was another purpose? Gen. 1: 29.

10. What was still another reason for making plants? Gen. 2: 9.

11. Name plants which furnish man with food.

12. Name some which furnish food for the lower animals.

13. Name plants which serve only to adorn the earth.

14. Are we invited to study these beautiful plants? How shall we study them? Matt. 6: 28-30.

Note Book Requirement

Write a story about the creation of plants. Page 39.

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Lesson XLVII

The Relation of Plants to Light and Heat

Blessed of the Lord be his land, . . . for the precious fruits brought forth by the sun, and for the precious things put forth by the moon. Deut. 33: 13, 14.

Did you ever find a plant trying to grow in the cellar? Did you notice its pale, sickly color? This is because so little light could reach it. For the same reason the grass blades under boards and stones are colorless.

In the springtime and in the summer, when the sun's rays are flooding the earth with warmth, how do the plants behave? In winter, when chilling winds and biting frosts visit our gardens, how do the plants fare?

Some plants are more hardy than others, being able to endure cold through all seasons. What class of plants

have you noticed to be the most hardy? Which the least hardy?

Some plants need less light than do others, and can not endure the direct rays of a bright summer sun. Others glory in his burning glance, and daily watch with wide-open flower-eyes his passage through the sky.

TROPICAL FOLIAGE

Plants of most brilliant foliage and flowers of most gorgeous colors are found in the tropical regions. This is the work of the bright tropical sun rays.

In the temperate belts, too, the sun lends to flowers and fruits beautiful shades and delicate tints of color.

What about color in the cold polar regions? The flowers of these snow-bound regions are, for the most part, few in number and very pale in color. What plant life does exist in these regions, receives but little warmth and light.

The abundance of light and heat lavished upon the equatorial regions accounts only in part for the dense tropical foliage. What else is necessary? This we will talk about in our next lesson.

Questions

1. What is meant by the word *tropical?*

2. Across what continents do the tropics extend?
3. What tropic lies north of the equator?
4. What south of the equator?
5. Parts of what continents lie between the tropics?
6. By what name have we called this belt?
7. By what other name is it mentioned in the fifth paragraph of this lesson?
8. What continents lie in the North Temperate Belt?
9. In the South Temperate Belt?
10. In the North Cold Cap?
11. In the South Cold Cap?
12. Would you expect to find as dense vegetation on the highlands and high mountains of the Hot Belt as in the lowlands?

Lesson XLVIII

The Relation of Plants to Air and Water

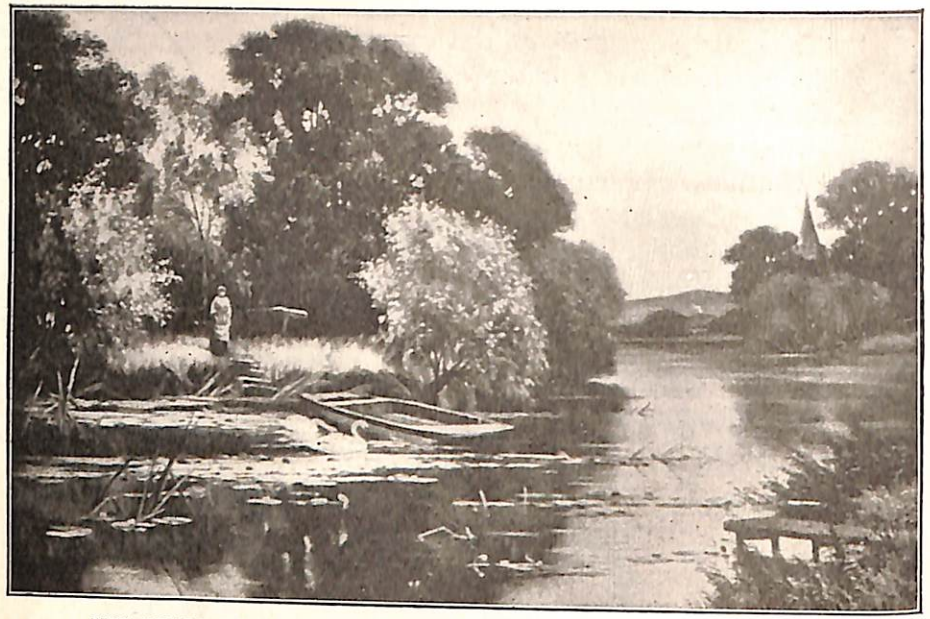
I will be as the dew unto Israel: he shall grow as the lily. Hosea 14: 5.

WHAT WATER WILL DO IN THE DESERT

Perhaps you have heard before that plants breathe. Of course you know that all plants drink, and that some, more thirsty than others, can not live without *much* water.

Now you see how very wise it was that both water and air, as well as light and heat, were provided before the creation of plants.

But of what use is the air to plants, and how are they able to take in air without lungs? If you have never stopped to think about this, you will be surprised to learn



"HE SHALL BE LIKE A TREE PLANTED BY THE RIVERS OF WATER"

that every plant is provided with breathing cells, and that they breathe over the whole surface of their bodies.

In summer, by the dusty roadside, you have seen plants almost white with dust, and looking quite ill and lifeless. Why is this?—Their little breathing organs are so choked that they can hardly get any air at all. They are almost smothered by the dust.

Plants not only breathe out and in, but they feed upon the air. They eat that part of the air that would be poison to man and animals. Is not this a wise arrangement?

While the leaves are breathing and feeding *above* ground, the roots down *below* creep about among the rocks and soil. They are in search of food that exists in abundance, but which, without water, they would never be able

to take in; for plants can not take their food in a solid state.

Now why do plants eat and drink? It is simply because they are hungry. They wish to become strong enough to make leaves and flowers and fruit. In their search for food they are obeying the command of the Creator.

The earth is obeying His command, also, when it furnishes food for their life.

The water is obeying His command when it helps the roots to dissolve this food.

The air is obeying His command when it allows itself to be used as food and breath.

Light and heat are constantly obedient, and are of service to plants.

What do you learn from reading Job 14: 7-10?

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Lesson XLIX

Seeds

The seed is the word of God. Luke 8: 11.

The Lord arranged that new generations of plants should be produced by the plants that He created upon the third day. Do you know how He planned to do this?

In every seed we find a tiny sleeping plant. The mother plant wraps within a strong covering her sleeping "seed babies." Have you ever opened one of these plant cradles, and taken a look at the baby plant within?

Every herb, every tree, and all grasses were commanded to produce seed after their kind. In bearing seeds,

they are obeying the command of their Creator,—they are carrying out God's plan in their creation. Gen. 1: 11, 12.

Wrapped in the morning-glory seed is a beautiful vine. Cradled in the acorn which you may hold in your hand, is a gigantic oak. Safely housed within the walls of a peach pit, is a tree like the one from which the peach fell.

Did you ever watch a baby plant waken? Did you

ever watch it creep out of the seed cradle, stretch its baby arms, and begin to grow? Did you ever watch it day by day, as it ate and grew?

What do the seeds need in order to grow? Upon what do baby plants feed? How do they eat?

Soak as many different kinds of seeds as you can find. Place some in dry sand; place others away in a dark cup. Will these grow? Why not?

Place some of your soaked seeds in wet sawdust. Place others between damp blotting papers. Place others upon wet cotton or netting stretched over a glass of water. These seeds can be easily watched. Plant some of your seeds in rich, loamy soil, and watch their growth.

From the seeds we may learn beautiful lessons. I will not tell you what they are, for I want you to learn them from the seeds.

Questions

1. To what did Jesus liken His word?
2. To what did He liken the hearts of His hearers?

3. What five things do seeds need in order to grow into sturdy plants?
4. What do human plants need in order to be fruit-bearing Christians?

GARDENING

Lesson L

The Common Bean

You have planted your school gardens, perhaps. Did you plant any beans in your garden? Did you study the seeds carefully before you planted them?

Did you compare the beans you planted with other beans? Did you find all beans alike in surface markings? Do you find them all alike in shape? In color? How many kinds of beans did you collect?

Did you soak your beans before you planted them? If

COMMON BEAN

SOAKED BEAN

COTYLEDON AND BABY PLANT

so, they will come up sooner; and if you examined the different parts of the bean seed, you found that the markings were plainer after they were soaked.

Did you notice the scar on the seed where it was attached to the pod? This scar is called the *hilum*.

STAGE I

STAGE II

STAGE III

Near the hilum did you find a minute opening? This small opening was made by one of the little pollen roots when it entered the seed to fertilize (feed) it. It is called the *micropyle*. Examine a pea, and you will find the micropyle more easily than in the bean.

STAGE IV

If you remove the tough skin, or *testa*, from your soaked bean, you find beneath it two fleshy seed leaves. These are called *cotyledons*, and will become the first leaves of the plant. These leaves are full of food, which the mother plant has carefully packed around the baby bean.

STAGE V

On one of the cotyledons you notice near the hilum a small, pointed body. This is the *caulicle*. The pointed end will produce the root, which will go down into the ground in search of food. The opposite end will produce the stem and leaves.

The first true bean leaves, one folded within the other, are large enough to be plainly seen. They are called the *plumule*, and between this pair of leaves is a small bud which will develop into the second pair of leaves.

Observe these curious pictures! Do your beans behave in this way? Now you see why the bean has been called a hump-backed baby. What is that odd-looking loop pushing its way above ground?

See! Here are the cotyledons! What change in color do you notice? Do you discover any other change in these thick, fleshy seed leaves? What becomes of the testa?

Notice the plumule develop. Where is the part of the caulicle that produced the root?

FULL-GROWN BEAN PLANT

Some beans have a twining stem. The tip of the stem is constantly traveling around like the hands of a clock. Observe whether all beans travel in the same direction.

Notice carefully the opening buds. By and by a bud shorter and thicker than the leaf buds appears. When its twisted green cover opens, what do you expect to see?

From what part of the plant do the bean pods develop?

Requirement

Plant nine beans in a box of earth, and after providing them

well with the five things necessary to growth, make careful notes upon their development as pictured in your Nature Note Book, pages 40 and 41, telling in a short composition what the study of the bean has taught you.

Lesson LI

Parts of a Plant

A perfect plant has six parts for you to notice: First, the *root;* second, the *stem;* third, the *leaves;* fourth, the *blossoms;* fifth, the *seed chamber;* sixth, the *seeds.*

THE DANDELION

These parts may be called the *organs* of the plant; and just as in the body every organ has its special work, so in the plant each part is fitted especially to do just the work for which it was intended.

You doubtless discover that all plants do not possess the entire number of parts named. You have seen little plants, like the dandelion, sitting close upon the earth, have you not? What part is lacking in such plants? Do you know of plants on which other parts are lacking?

Plants may exist without all the organs of a perfect plant. Yet each little plant is perfect in its own way, and the more closely one looks, the more this perfection appears.

From the tiniest of the plant creation, too small to be seen with the naked eye, up to the towering giants of the forests, every plant was created with parts fitted to its purpose in God's plan.

The tiny mosses bear no flowers, neither do the ferns; yet how beautiful they are! How well they have learned to make the most of what they are, and how pleasing is the result!

The parts of a plant are developed from the same food. Is not this a mystery? Each plant organ knows how to take from the sap just that which will build up its particular part, and make it strong to carry on its particular duties.

We shall study in other lessons the duty of each of the organs which we have noticed in this lesson.

Lesson LII

Roots

The root of the righteous yieldeth fruit. Prov. 12: 12.

When you examined the roots of the bean and other seedlings, did they look alike? Are all roots like these?

Roots have been rightly named plant-servants. Do you know why?

One great duty of the roots is to hold the plant firmly in its place. With thread-like fingers it lays hold of the earth with a grasp that it must never lose until the work of the plant is completed.

Another great duty of the roots, and perhaps the most important duty, is to bring food and water from the ground for the whole plant household.

Down in the dark earth, great roots and tiny rootlets patiently thread their way in search of nourishment. In hot, dry weather it may be a very discouraging search, for the roots must find enough moisture to dissolve the food.

LARGE ROOTS OF A TREE

This power to dissolve the solid earth and through countless little root mouths suck it in as food for the hungry plant family, is a wonderful part of the work of a root.

Plants are usually very careful in choosing the location of their homes. Such as are always calling for water never settle down in a dry, sandy field. Some plants grow only in bogs and marshes, where the water supply is plentiful. Others, being able to get along with a moderate supply of water, choose the sunny hillside.

There are other uses of roots. On some climbing plants, sturdy little thick-set roots run out from the stem, and assist in the work of lifting the plant from the ground.

Roots are often a storehouse for plant food. The radish, the beet, the carrot, the parsnip, are such roots.

Such roots provide food for man and beast, and their cultivation is of great importance. Sugar made from the beet is an article of commerce.

Have you ever read a passage of Scripture that says we should be rooted and grounded in the truth, even as a plant is rooted and grounded in the earth?

Note Book Requirement

On page 42 write a composition on what you know about roots as food.

Lesson LIII

Stems and Branches

I am the vine, ye are the branches. John 15: 5.

In observing the growth of seedlings, you saw that one part of the plant grew upward. This part we call the *stem*.

Stems are of different shapes. Observe the stems of several plants, and notice whether they are round, square, or triangular.

The stems of plants vary greatly in size. The trunk of a tree is a stem; so is the slender violet stalk.

The covering of stems may be rough, smooth, hairy, or prickly. What do you call the covering of a tree trunk?

Stems have two ways of growing. One great class of stems grow on the inside. The cornstalk is an example of this class. It dies down each year. Another great class of stems grow on the outside. Most trees are examples of this kind. Each ring in the trunk of a tree represents a year's growth.

A stem forms a connection between the roots and the leaves. Through the stem the sap must be carried up into the buds, leaves, flowers, and fruit.

The main stem of many plants runs to the very top, while in others it divides into larger *branches*, and is lost.

Observe how the branches are arranged on the main stem. Is this arrangement the same on all kinds of plants?

Stems that contain little woody fiber, usually die down to the ground every year. Grasses, milkweed, peas, beans, and all such plants are among these.

Some plants produce *underground stems*. These are often thought to be roots, but this is not true, for roots never produce buds nor leaves, and these stout underground stems do. The potato is an underground stem. The eyes on the potato are buds. Another short underground stem is the onion.

Plant stems are very useful to man in other ways than for food. The trunks of trees furnish wood for fuel, for the building of ships, and for houses and furniture. The stem of the flax gives us the thread for linen. The bark of certain trees supplies cloth to natives in the islands of the sea. Cork is made from the bark of the cork tree, which grows in Spain. Rubber is made from the sap of a tree called the rubber tree, which grows in South America.

From the sap of still another tree milk and sugar are obtained.

The branch has no power to grow and bear fruit unless it is connected with the tree. What lesson does this teach us? John 15: 4-6.

Note Book Requirements

1. Draw horizontal sections of the cornstalk and oak trunk on page 42.
2. Write a story about the drawing on page 44.

Lesson LIV

Buds and Their Uses

Israel shall blossom and bud, and fill the face of the world with fruit. Isa. 27: 6.

If in winter we examine carefully the stems and branches of trees and shrubs, we shall discover buds, each one just above a little scar. This scar marks the place where the old leaf was attached.

Buds are offshoots from the stem or branch, and may develop into either a branch, a leaf, or a flower.

When the orchard branches look cold and lonely, it is a good time to study buds.

Notice that all twigs, if uninjured, terminate in buds. Such buds are called *terminal* buds.

Buds growing upon the side of a twig are called *lateral* buds.

WILLOW BUDS

Examine carefully the buds of the horse-chestnut, poplar, willow, and cottonwood, and see how snugly and cozily the leaves are packed away.

Questions

1. When do buds make their appearance upon the orchard trees near your home?
2. What enabled the delicate buds to live through the winter?
3. Into what are terminal buds likely to develop?
4. How are the scales arranged?
5. Of what use is the sticky covering found on some buds?
6. Of what use is the soft, woolly covering underneath the scales?
7. Have any of the seedlings studied, developed buds?
8. Whose power gives life to the bud that it may grow? Num. 17:5, 8; Isa. 55:10.

Requirements

1. Gather and bring to school during the late winter as many different kinds of branches as you can find.
2. Put them in water in a warm, bright corner, and see what happens.
3. You will enjoy seeing them grow bigger and bigger until the outer wrappings are forced apart, and the delicate baby leaves begin to stretch themselves.

Lesson LV

Leaves and Their Arrangement

His leaf also shall not wither; and whatsoever he doeth shall prosper. Ps. 1:3.

Into what have the buds which you placed in the water developed? Should you remove the twigs now bearing leaves from the water, what would happen? Why does

a plant need more water when covered with foliage than at any other time? During the winter, our orchard trees bear no foliage. Why is this? Of what use are the beautiful leaves to the plants and trees?

You see this subject of leaves is fairly bristling with

AN AUTUMN SCENE

questions. Doubtless you have studied leaves before this. You have noticed their various shapes and brilliant colors. You have enjoyed the gorgeous colors of the autumn leaves. Did you gather any last fall? What kinds did you collect? They will help you to answer these lesson questions.

Look at the surfaces of leaves, and notice whether they are smooth, hairy, or woolly. Upon what plants do you find smooth leaves? Do the plants having hairy surfaces

grow in damp or in dry places? Do you find that some leaves are thicker than others, and that some plants are more densely covered than others with leaves?

You find that all growing, living leaves are full of sap —the plant's food. You have learned how faithfully the

A SPRING SCENE

root servants work to supply this sap, and that the stem of the plant carries it upward. Why do all the plant servants work so diligently that the sap may reach the leaves?

The sap is raw food—mineral food—before it reaches the leaves. The green leaves, by means of the light, change this raw food into plant material,—cook it, we might say, —so that besides being the *lungs* of the plant, the leaves

are really small kitchens for cooking food, and at the same time each leaf is a pantry where the cooked food is stored until the plant's work for the season is completed.

Now you see how important it is that every plant should be supplied with an abundance of these air and sunshine

ALTERNATE OPPOSITE WHORLED

catchers. You will notice that, if a plant does not produce leaves, the green stem or some other portion of the plant is obliged to do the work of the leaves, otherwise the plant would die.

Now notice carefully the arrangement of leaves on the twigs and branches everywhere. See how anxious the plants are that every leaf surface should have just the right amount of light, and how every plant arranges its leaves so that they are equally exposed, and thus each one is able to do its proper share of work.

Most plants arrange their leaves upon the branches according to some regular plan. You will observe that there are three regular ways in which they live and arrange themselves:

1. They may be *alternate* in their arrangement, like the leaves of the oak.

2. The arrangement may be *opposite*, like the leaves of the maple and the box elder.

3. They may be arranged in *whorls*, as in such plants as the galium, or goose grass.

Having examined the arrangement of the leaves on the twig, look at the branches, and discover, if you can, whether there is any relation between the arrangement of branches on the trunk and the arrangement of the leaves on the branches.

Leaves are of as much use to man as are stems. They furnish food to the lower animals. They provide refreshing shade. You have already learned that the natives of some countries use leaves for dishes and clothes, as well as for sails for their boats, and for thatch for their houses.

Requirement

Make a list of all the plants with which you are familiar, that arrange their leaves in some regular way, describing the manner of their arrangement.

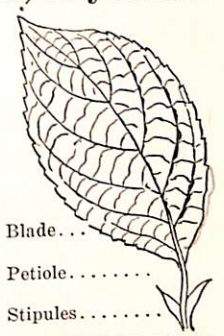
Lesson LVI

The Framework of Leaves

The parts of a leaf are: 1. The long, slender stalk, or *petiole;* 2. The thin, widened portion, or *blade;* 3. The little leaf-like bodies attached one on each side of the petiole. These are the *stipules.*

All leaves do not develop stipules, and in some cases the stalk, or petiole, may be missing.

Now notice what supports the wide, thin leaves so that they do not droop. You see a network of *veins*, do you not? These are sap channels, that stiffen with the growth of the leaf frame.



A SIMPLE LEAF

Examine an apple leaf (cherry, oak, or willow will do), and note the following:

1. The petiole continues throughout the blade from base to tip. This is called the *midrib.*

2 Veins extend obliquely from the midrib to the edge of the leaf. These veins are arranged like the barbs of a feather, and the leaf is said to be *pinnately* veined, or feather veined.

3. Small veinlets form a network between the veins. Hence such leaves are said to be *pinnately netted* veined.

Other leaves are differently veined. Examine the lower surface of a geranium leaf, and notice several large, prominent veins extending from the end of the petiole, like the fingers spread from the palm of the hand. Such a leaf is *palmately* veined. The smaller veins and veinlets form a network, so that the entire leaf is said to be *palmately netted* veined.

CLOVER LEAF

Examine a corn leaf. Is it either pinnately or palmately veined? The veins in such leaves run somewhat parallel, and are called *parallel* veined leaves.

Compare the leaves of wheat, oats, and grasses with the corn leaf. The veins of these leaves run parallel also.

Did you ever find any leaf skeletons when you were playing in the woods? The framework of leaves attains

the greatest strength in the fall of the year, and beautiful skeletons may often be found under willow, maple, chestnut, and elm.

Requirements

1. Collect and mount leaves showing the three different plans of leaf venation.
2. Take some sheets of stiff paper, two little balls of woolen cloth, and a little printer's ink in a cup. With one woolen ball, spread a little ink very carefully all over the under surface of a nice, fresh, perfect leaf. Now lay the inked side down on your sheet of paper, and very gently pat it all over with the other woolen ball.

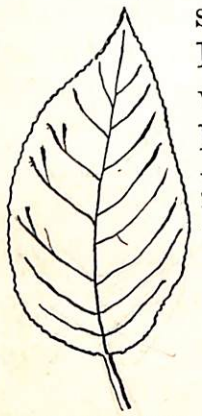
Note Book Requirements

1. Describe the drawings found on page 45.
2. Describe the framework of leaves found on page 46.

Lesson LVII

Kinds and Shapes of Leaves

Perhaps before this you have attempted to count and see how many kinds of leaves you could find. Did you find that you had a large piece of work on your hands? Did you find that the leaves are very similar, or very unlike? Can you find any leaves similar to any other leaves?



SIMPLE LEAF

Perhaps you may not think it possible to classify your collection of leaves into two kinds. I will tell you how it can be done. Place all those leaves that have but one midrib in one pile. Place all those in which the midrib divides, each division bearing leaflets, in another pile.

In the first pile you will have the apple, the cherry, and the elm leaf. These leaves in your first pile are all *simple* leaves.

COMPOUND LEAF

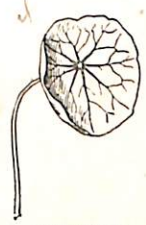
In your second pile you will have such leaves as the rose, the clover, and the locust leaf. Such leaves are *compound*. Of which kind are you able to secure the greatest number, the simple or the compound?

Now I want you to notice the shapes of all the leaves you have secured. Look at your collection of simple leaves, and sort them into piles according to their similarity of shape.

Of course you will place the nasturtium, geranium, and all other round leaves in one pile. They are *rotund* in shape. Rotund leaves may be either pinnately or palmately veined. They may be very small or very large.

Growing in still pools in the Amazon region, is a cousin to our white pond lily, whose immense and beautiful rotund leaves are from eight to ten feet across. I wonder why these water lilies need such large leaf surface. Can you tell?

CORDATE



ROTUND

OVAL

OBLONG

Among your leaves do you find any that are oblong? Any leaf that is longer than wide, and somewhat rounded at both base and apex, is *oblong* in shape. The milkweed is oblong.

"THOUGHTFUL MOMENTS"

You will probably find leaves that are perfect ovals. Many of the leaflets on your compound leaves are *oval* in shape.

The leaves that are shaped like a heart are called *cordate* leaves. Look at a violet leaf.

You may find *arrow-shaped* leaves. Such leaves are widest at the base and taper toward the apex, while all the other shapes we have named—rotund, oblong, and oval—are widest in the middle and taper alike toward both ends. Doubtless you have collected many other shapes, but we will not try to describe and name any others at this time.

Requirements

1. Press and mount an example of (*a*) a simple leaf; (*b*) a compound leaf.
2. Press and mount a leaf for each leaf shape described in this lesson.
3. Press and mount the most beautiful leaf you have in your leaf collection.

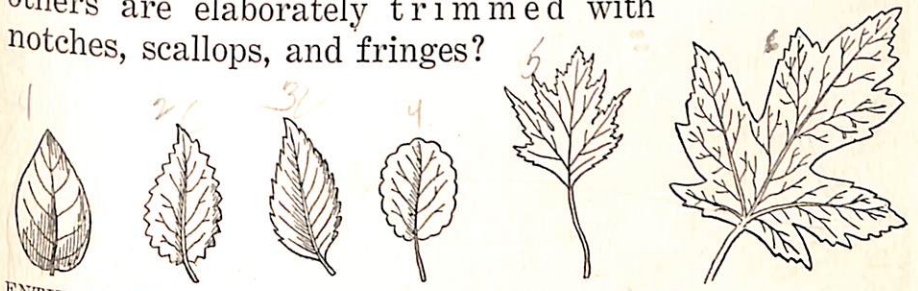
Note Book Requirement

Describe the leaf shapes found on page 47, and if you can, name a leaf for each shape.

Lesson LVIII

The Margin of Leaves

More about leaves? O, yes. Let us look at their edges, or margins, this time. Have you observed how very unlike are the edges of the leaves that you have already studied? Why is this? Why are some given plain edges, while others are elaborately trimmed with notches, scallops, and fringes?



ENTIRE DENTATE SERRATE CRENATE CLEFT

When the edge of a leaf is not indented, we say that it is *entire*.

We call the margin *dentate* when little pointed, tooth-like projections appear on it.

When the margin is indented by saw-like projections, we call it *serrate*.

When the margin is scalloped, we say that it is *crenate*.

Leaves may be *lobed*, *cleft*, or *parted*.

LOBED

Requirement

Collect ten leaves, and mount upon cardboard, writing upon the back of each a description of the leaf, telling: 1. kind of leaf; 2. kind of veins; 3. shape of leaf; 4. kind of margin; 5. arrangement of leaf on branch; 6. color of both surfaces; and 7. kind of surface.

Note Book Requirement

Describe the margins of the leaves found on pages 48 and 49.

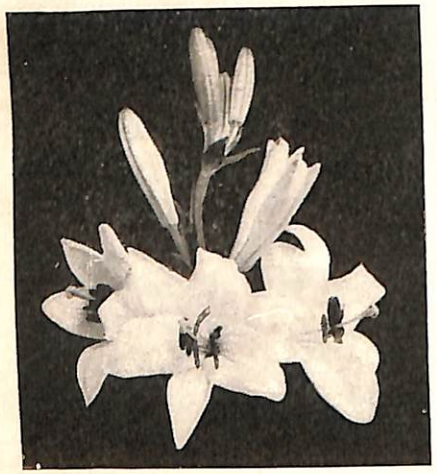
Lesson LIX

Flowers

The flowers appear on the earth; the time of the singing of birds is come. Song of Solomon 2 : 12.

Notice whether, upon the twigs you have collected, the flowers appear before the leaves. Plants have a reason for everything they do. The more closely you watch them, the better you will understand God's plan for each one.

Take a good look at a flower, and notice its beautiful and delicate structure. How does it compare with a work of art? Did you ever see a picture that copied all the beauty of any of our most common flowers?

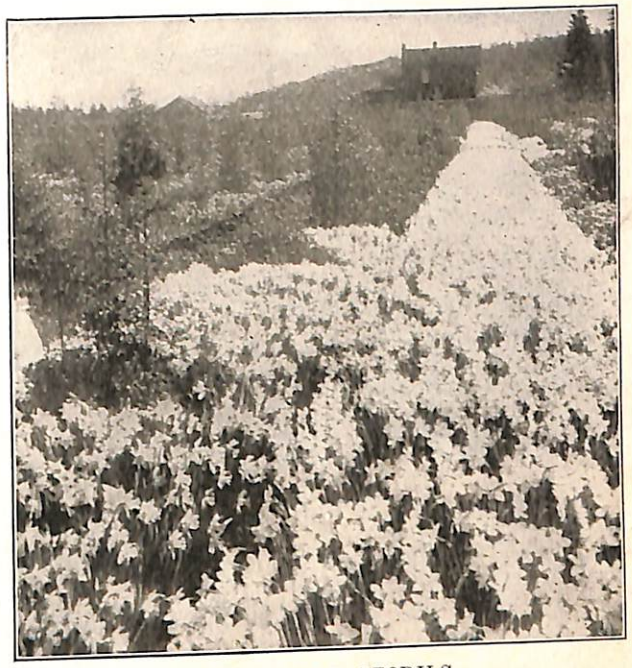


EASTER LILIES

Notice, too, the beautiful coloring. You have already learned that light is the agent that God uses in painting the colors of flowers. Are all colors of light to be found in the flowers? How wonderful that out of the same sap the light can make the variety of colors, shades, and tints which we behold in a single pansy! You have learned whence all these beautiful colors came, but why is it so? Why does

the plant put more color in the blossom than in any other part of the flower?

And then the fragrance! Like the color, it delights us. With your eyes closed, can you not distinguish between a sweet pea and a violet? Can you not distinguish between a rose and a clover blossom? Why does the plant give so much attention to placing such sweet fragrance in the blossom? It is true that God intended that the blossoms should please our eyes, and that the fragrant odors should be refreshing; but of what use to the plant are the bright coloring and pleasing fragrance?



A FIELD OF DAFFODILS

Notice the shapes of flowers. Are they all built upon one pattern? Have you not found some that spread out like round saucers? Some like deep cups? Some so deep that you can compare them to bottles or fancifully shaped vases? Why are these various shapes? Of what use are they to the plant?

Then, too, have you not noticed the different ways dif-

ferent plants have of grouping their blossoms? How many ways have you observed? Why do some plants never produce single blossoms, but always a group? Of what use is this to a plant?

Have you noticed, too, that some plants have a favorite time for opening their blossoms? Some open only at night. Why is this? Some open when it rains; others close when it rains. There is wisdom in a frail flower with a large cup closing during a heavy shower, is there not?

This habit of opening and shutting their petals is an interesting one to watch. By watching for yourself, you will be able to learn from the flowers lessons that no book can teach you.

When Jesus was here on the earth, He taught much from the plants. Many beautiful lessons are wrapped up in the flowers. He Himself "plucked the beautiful lily, and placed it in the hands of children and youth; and as they looked up into His own youthful face, fresh from the sunlight of His Father's countenance, He gave the lesson, 'Consider the lilies of the field, how they grow.'"

If you are not already able to answer all the questions suggested in this lesson, think carefully about them until you can do so.

Requirements

1. Make a collection of flowers having pleasant odor.
2. Make a collection of flowers representing as many different colors as you can find.

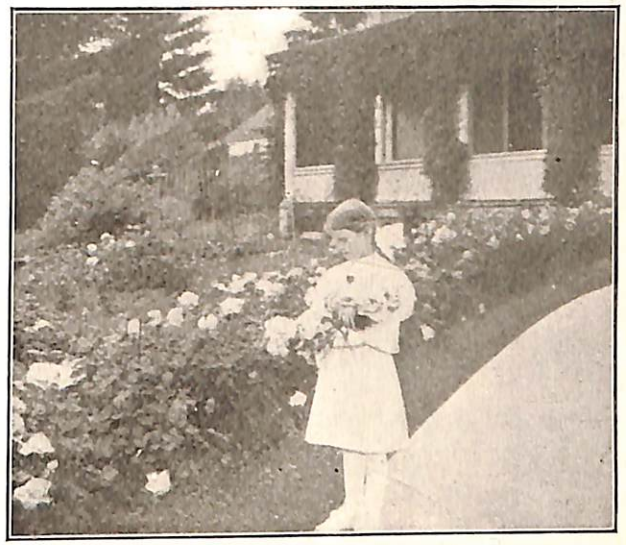
Note Book Requirement

Draw a page of morning-glories, and color them.

Lesson LX

Seed Factories

Have you ever looked into a flower, and examined closely its special parts, or organs? You have admired its color, you have enjoyed its fragrance; now let us learn a little of its interesting work.



"WE SHOULD BE LIKE GARDENS"

"Work!" you say. Yes, the work of the flower is the great work in which every other part of the plant is interested. If this work be not performed, the very object of the plant's existence is defeated. *What*, pray, *is* the work? We shall see.

First, please answer these questions: Perhaps you have been told, before, the names of the different parts of a flower; and we shall need the names in the study of the work of the flower. What is that yellow flower dust that sticks to your nose when you plunge it into a rose or into a cherry blossom? What is the name of that circle of slender, threadlike stalks that hold up the *pollen* boxes in your flower? What is that sticky, knobbed body which the

stamens surround? *Pistil* is another form of the word *pestle*. You have seen a pestle, have you not?

By what name do we call the circle of bright yellow leaves in a buttercup blossom? Below the *corolla* is another circle of leaves, forming a little green cup. *Calyx* is a Greek word meaning "cup." The flower calyx forms a protection to all the other parts we have named.

But we have not yet discovered the most precious organ—the part which the other organs are all made to nurse and shield. At the bottom of the pistil you find a small case or bag. What is it? Watch it grow from day to day. Does it grow smaller or larger? The flower withers and drops from the plant, for its work is done. But what becomes of this seed case? If you can not answer these questions now, keep on the lookout until you can. Be able to answer them for more than one flower.

Honey Bees Gathering Honey from Snapdragon

So the great purpose of the plant is seed growing. The plants we see about us are all working to develop seeds. The flower is the seed nursery. The baby seeds are there cradled and nursed by the flower servants. Roots, stems, leaves, and all the various flower parts are working together in obedience to God's plan, that every plant should "bring forth seed after its kind."

You have already seen how the roots, stems, and leaves help. You have seen how the calyx helps. Examine the calyx of different flowers, and observe the relation of the calyx to the seed box.

Do the petals help? O, very much indeed. They are thrown out, like gay handkerchiefs, by the plants, that their beauty and fragrance may attract insects and birds.

But why do they wish to call these strangers? It has been found out that birds and insects are really the flowers' partners in this work of seed making, and that the whole work of the plant would be in vain were it not for the help of these partners in their business of seed manufacture.

The pollen dust which the stamens manufacture is very precious indeed. Unless pollen is carried from flower to flower, the seeds will never develop in their seed cradles.

The pistil conveys the precious flower dust to the seed babies, but the flower must depend upon the outside friends—the wind, the birds, the bees—to bring to it the pollen food. In return for the favors it expects to receive, the flower prepares for its friends delicious nectar, and keeps the sweet feast constantly on hand until it has treated its guests and been helped to finish its work.

A plant bearing beautiful flowers and giving off fragrance is a fit symbol of a Christian.

"We should be like gardens,
Bright and sweet with flowers,
Blessed by heaven's sunshine,
Cheered by gentle showers."

Requirement

Make drawings of some familiar seed nursery, and name the

flower organs. Study the parts with a magnifying glass, and if possible, make drawings.

Note Book Requirement

Write a short story about "Flowers and Their Partners," on page 50.

Lesson LXI

The Fruit and the Seed

Herein is My Father glorified, that ye bear much fruit. John 15: 8.

Have you ever watched the blossoms of any of the plants that grow about you, to see just how long they remain on the plants? Keep an eye on the trees in the orchard, and on the flowers in the garden, if you want to see a wonderful Power at work.

TREES LADEN WITH FRUIT

Every plant develops its own favorite style of seed cradle,—one "after its kind,"—fitted exactly according to the needs of its own particular children. Do you know that what we call an apple is the best seed cradle that could ever be given to the children of the apple tree? The bean pod is exactly the cradle necessary to accommodate bean babies.

There are two great classes of seed cradles:

1. The soft, *fleshy* fruit.
2. The hard, *dry* fruit.

The nuts, grains, pods, and winged seeds are all classed among the dry fruits.

For each plant the Creator has provided some means of scattering its ripened seeds. How these seeds become scattered depends a great deal upon the cradle in which they are ripened.

A COCOANUT RAFT

The seeds that ripen in soft, juicy seed boxes, are pretty sure to be plucked and scattered. Birds and beasts assist man in scattering the seeds of such fruits.

All seeds provided with dainty wings and other sailing devices are carried from place to place by the wind.

Those that will not sink are carried great distances upon the water. Do you understand now why cocoanut palms are the first trees to appear upon coral islands?

Some seeds ripen in boxes that manage to explode at just the right time, and scatter their contents to a considerable distance from the parent plant.

Do you not see that while the whole plant is tirelessly working to accomplish its *own* work, it brings at the same

time blessings to God's creatures? Is not this just like our heavenly Father?

Can you think of anything which we have studied thus far that ministers to nothing but its own needs?

The planted seeds are not lost, however widely they may succeed in scattering themselves.

The scattering of kind, loving deeds will gladden hearts and produce fruit,—that kind of fruit of which Jesus spoke when He said, "By their fruits ye shall know them."

"Little ones may be just like the fruitful trees;
Buds are like our hearts, which only Jesus sees;
Blossoms are like faces, smiling clear and bright;
Leaves are gentle words; good fruit is doing right."

Requirement

Make a classification of the fruits of the plants with which you are familiar. Which class do you find more numerous, the dry or the fleshy fruits?

Note Book Requirement

Describe the seed boxes pictured on pages 51 and 52.

Lesson LXII

Plant Families

Not all houses are built upon the same plan. There may be more bedrooms in one house than in another, there may be more hallways within and porches without. Flowers, too, are built upon different plans. Has a buttercup as many petals as a lily? How do the parts of a dandelion compare with those of a sweet pea?

Now compare a wild rose and an apple blossom. Are they not built on a similar plan? Compare a lily of the valley and a tulip. Compare a daisy and a dandelion. Compare a violet and a pansy, counting the petals in each, the sepals, the stamens, the pistils, the seed chambers.

The *lily family* is a well-known family. The tulip, the hyacinth, the trillium, the onion, and all true lilies are members of this large family. These lilies are pleasant

PLEASANT SCHOOLGROUNDS

flowers to study. Their parts are large and simple, and are arranged in sets of three. Lilies are showy and fragrant, some of them being our most beautiful ornamental plants. Members of the lily family are found in all climates. Some of them are food plants, such as the onion, garlic, leek, and asparagus.

The common blue violet is a type of the *violet family*. It is loved because of its beauty and delicate fragrance. It grows from six to twelve inches high, in moist, rich soil, and will be found more abundant on the banks of small streams. The petals are five in number, but are not all

the same size nor shape. Some of the near relatives of the blue violet are the yellow violet, the English violet, and the pansy. Violets are used for medicine, for coloring, and for perfume.

The dandelion, daisy, sunflower, goldenrod, and marguerite all belong to the *composite family*. So do the asters and the thistles. All the members of this family have the habit of bunching together a quantity of tiny flowers, which, taken all together, look like one large flower.

Then a dandelion blossom is not really a flower; it is a bunch of flowers.

How many separate blossoms will you find in a daisy? The daisy is made up of yellow, strap-like flowers in the center, and long, strap-like flowers on the outside. Members of the composite family are scattered far and wide.

You have heard of the *pulse*, or *pod family*. Its members are well known. Some of the most familiar are the sweet pea, the garden pea, the bean, the lentil, and the clover. It is a very large and a very important family, and is very abundant in tropical regions.

The *orchid family* is noted for the beauty of its flowers. It certainly takes great pains to attract the attention of the bees. Its building plan is very difficult. Orchids are tropical plants. The lady's slipper is a member of this celebrated family. Sometimes they are yellow, sometimes pink, sometimes white.

There are other families in the plant world beside these. Among them are very important ones, such as the *grass family*, the *pine family*, and the *maple family*. One very large family, the members of which are very common, we will consider in our next lesson.

Lesson LXIII

The Rose Family

I am the rose of Sharon, and the lily of the valleys. Song of Solomon 2: 1.

The apple, plum, prune, peach, almond, apricot, cherry, strawberry, blackberry, raspberry, and dewberry are all members of this large family. What could we do without this great family of fruit producers? We should miss it if it should fail us but for one season. Members of this family furnish a large proportion of the fruits of the North Temperate Zone.

"THOUGHTS OF GOD"

The apple tree, especially, is adapted to nearly all climates. It is a native of Europe, but it is now grown in nearly all parts of the world.

The berry relatives of the apple are very interesting. Look for the seeds of the strawberry. The soft flower cushion upon which the seeds rest has swollen until it makes the fruit. The seeds, in small, dry seed boxes, rest upon the surface of this delicious fruit.

The blackberry seeds ripen inside of sweet, juicy seed cradles. These are packed upon the juicy flower cushion, and together they make a delicious mouthful.

How about the raspberry? In it the flower cushion does not become sweet and juicy, and so does not become a

part of the fruit. The juicy ripe seed boxes alone form the raspberry.

Note Book Requirements

On pages 53 and 54 write a story about the apple or any other familiar member of the rose family, following the outline below:

1. Kind of soil in which it grows.
2. In what climate or country it thrives.
3. Describe its roots.
4. Describe its stem.
5. Describe its branches.
6. Describe its buds.
7. Describe its leaves.
   - (*a*) Kind.
   - (*b*) Arrangement.
   - (*c*) Framework.
   - (*d*) Shape.
   - (*e*) Margin.
8. Describe the flowers.
9. Describe the fruit.
10. Describe the seed.

Questions

1. When does the apple blossom in your orchard?
2. How many sepals has the blossom?
3. How many petals?
4. How many pistils?
5. What do you notice about its stamens?
6. By what insects are the apple blossoms visited?
7. How is the calyx related to the fruit?
8. Compare the apple blossom with the blossom of the cherry or peach.
9. Does the calyx help in these fruits, as it does in the apple?
10. How about the blossom of the plum, prune, almond, and apricot?
11. Make a study of as many of these as you are able to procure.

Lesson LXIV

Common Trees

The trees of the Lord are full of sap; the cedars of Lebanon, which He hath planted. Ps. 104: 16.

The trees have been rightly called our friends, for it is true that we are greatly benefited by them. Do you wish to know these leafy friends better? Then keep your eyes open, and think about what you see.

OAK

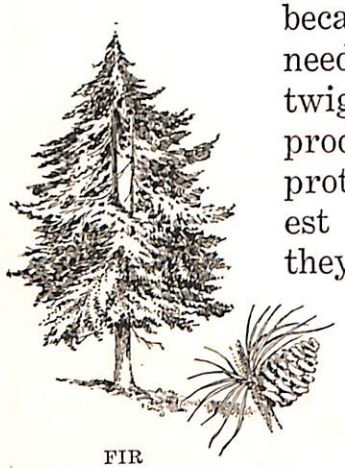
Trees are not alike—O, no! But can you tell in what ways they differ? How does the tree that leads a rugged, wild, struggling life differ from the tree that grows in the sheltered forest? How do evergreens differ from maples? Have you ever compared their leaves?

I am thinking of a tree whose short, stout trunk lifts aloft an immense weight of branches. I know that its roots are wide-spreading and many, for see how firmly it stands the strain of wind and tempest. Its stout, many-curved branches are hidden in a mass of dark green foliage. It extends a friendly shade and shelter to the creatures of earth and air. Its wood is strong, so strong that for hundreds of years it has been used in the building of ships. Is this tree a familiar one to you? If so, tell me about its leaves, its bark, its fruit. Did you ever discover upon its twigs tiny buds,

MAPLE

which you watched until they developed into the seed cradles with which you are doubtless familiar?

I am thinking of another family of trees. They are in shape like the fruit they bear. They are tall—very tall. Their leaves are very unlike those of other trees, and because they are long and pointed like needles, or narrow and flat like flattened twigs, and because, too, they are able to produce a thick, sticky gum, they are well protected from the cold, even in the coldest winter. Now you understand why they are called *evergreens*. Did you ever examine a cone, and discover where the seed children are hidden?



FIR

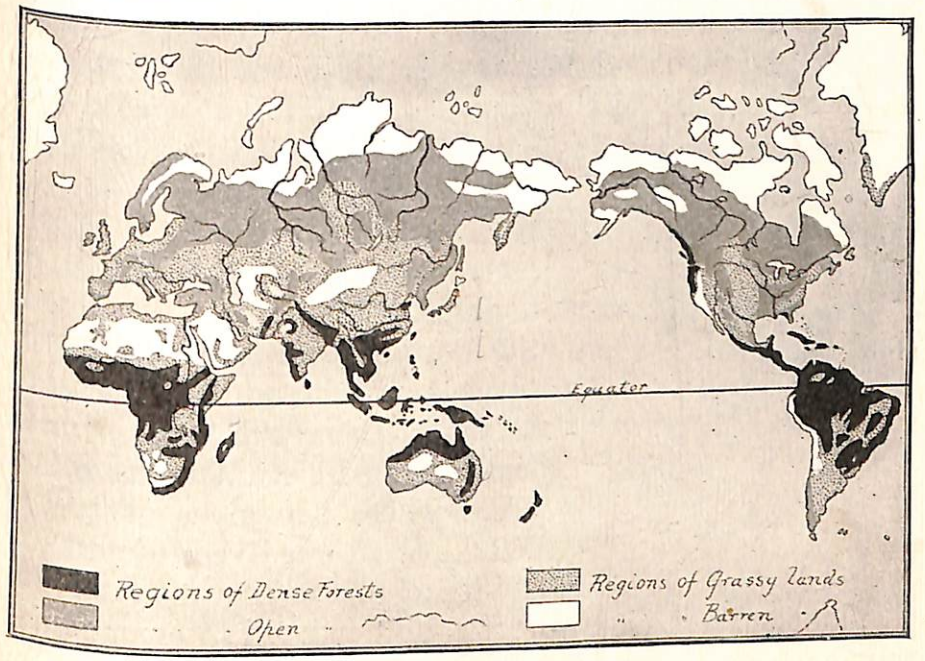
Many great forests of the *cone-bearing family* cover large parts of North America. When the continent was first discovered, almost all the land between the Atlantic Ocean and the Mississippi River was one dense forest of pine and other wood. Great pine forests are still growing in Maine. The wonderful redwood trees in California and Oregon belong to the cone-bearing family.

Let us consider one other interesting family of trees. When buds begin to swell on the naked limbs of these trees, we know that winter is going, and that spring is knocking at the door. Little flower tufts appear in bunches upon the twigs. Next, leaf buds unfold, and stretching upward from every leaf bud are eager fingers, reaching into the sunlight and air for food. Very rapidly do the broad leaves expand, and so eagerly do they eat that in a very little time

—usually early in the summer—little winged seed children flutter earthward, to announce what has been going on. Do you recognize any of this family in your neighborhood? Perhaps you are fond of maple sugar. Well, the sap of a member of this family furnishes great quantities of this delicious food. Every year 45,000,000 pounds of maple sugar are taken from the maple trees of the world. Of this, 30,000,000 pounds are manufactured from the trees in the United States of America.

Questions

1. In the northern hemisphere, where would it be necessary to plant trees in order to shield a home from the noonday and afternoon sun?



MAP SHOWING PLANT DISTRIBUTION

2. In planting trees for shade, is it better to plant evergreens, or trees that shed their leaves?
3. On what side of the house should evergreens be planted that they may break the force of storms, but not cut off the winter sunshine?
4. What does the Lord liken to a tree planted by the rivers of water? Ps. 1: 1-3.

Requirement

In an original composition describe your favorite tree.

Lesson LXV

The Uses of Plants

Out of the ground made the Lord God to grow every tree that is pleasant to the sight, and good for food. Gen. 2: 9.

For six thousand years, ever since the third day of creation week, the plants have been filling the place and doing the work that God assigned them.

COTTON READY TO BE PICKED

They provide food. We have seen that they work faithfully to do this. In some plants the root is the storage room for food. There are plants whose stems are good to eat. There are others whose leaves are edible. We have found trees whose sap gives us sugar. We have all our lives enjoyed the fruits of plants grown in our native land. We have also eaten and enjoyed luscious fruits that have been imported from distant parts of the earth.

Not only do plants feed us, but they clothe us, too. The cotton gives us its fibers for making cotton cloth. The cotton crop is very, very valuable. If all the gold dug in one year from all the mines in the world were gathered into one pile, it would not be worth as much as the part of the cotton crop which the United States sends every year to Europe. Very fine cotton is raised in Egypt, and in other countries where the climate is warm and has not too much moisture. Have you ever seen a cotton field? The seeds of the cotton plant grow in balls of white woolly fiber. The cotton is not gathered until the balls ripen and burst.

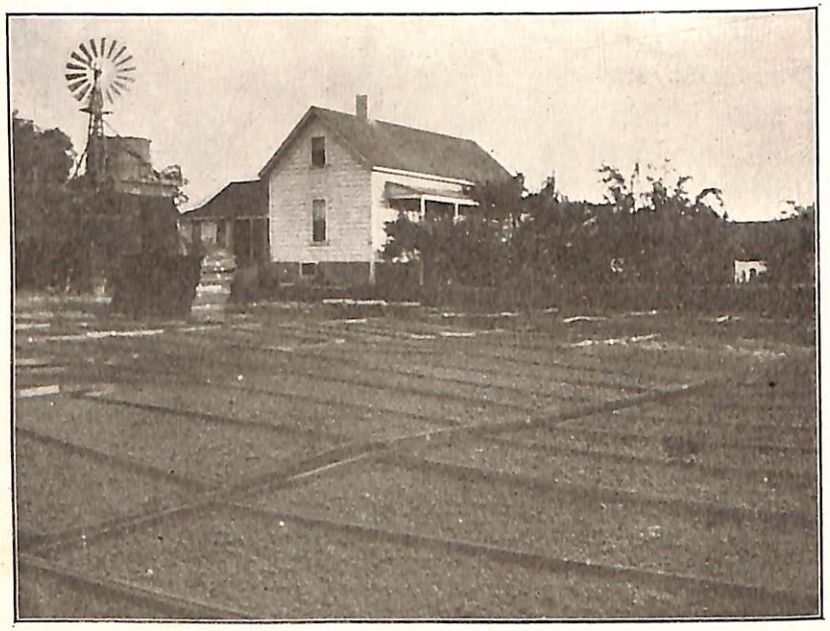
COTTON HARVEST IN MISSISSIPPI

Then, too, plants provide us with shelter. Think of the great lumber trade, one of the largest and most important of the world's industries. Timber for building houses and ships; timber for boards, planks, laths, scantlings, shingles, railroad ties, telegraph poles,—think of all the trees needed to supply what we use in that line! In Europe, and especially in North America, there are many, many people engaged in the lumber industry.

Plants supply our fuel. Do you say that you burn coal? Well, if you have not already learned that plants

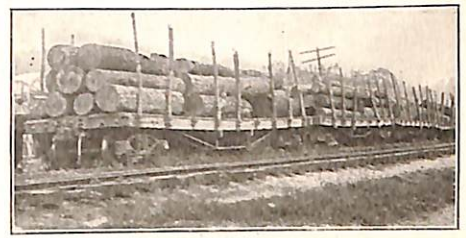
are responsible for the bright, warm blaze in your coal grate, you will be interested when you come to the story of coal. Plants, when used as fuel, are but giving back to us the light and heat stored up when they were living in the sunshine.

Plants store away not only heat, the companion of light, but they store away certain of the colors of light, as well. You remember we studied a little about the colors of light. Now, some plants store up coloring matter in their roots, some store it in their wood, others store it in their bark, and still others store it in their leaves. Men have learned how to separate this color material from the plant, and it is very useful in making dyes and paints.



DRYING PRUNES

It was God's plan that the beautiful garden in which He placed our first parents should be a sample of what men should make the whole earth. Constantly do the plants speak to us of a loving heavenly Father. Gardening was the first occupation given to man. It will never be taken away from him, but in the new earth we shall train and care for the beautiful plants.



LOGS ON WAY TO SAWMILL

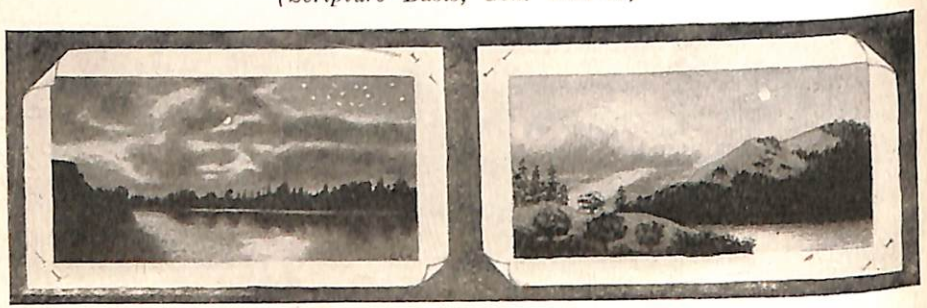
Questions

1. Give seven uses of plants.
2. What parts of plants provide food?
3. What parts provide clothing?
4. How do plants provide shelter?
5. What plants are especially good for fuel?
6. How are plants used in dyeing and painting?
7. What have you learned from your study of plants that makes you a happier and more useful child?
8. How long have plants been filling a place in the world?

CHAPTER VII

SUN, MOON, AND STARS

(Scripture Basis, Gen. 1:14-19)



"And God said, Let there be lights in the firmament."

Lesson LXVI

Light- and Heat-Givers

God made two great lights; the greater light to rule the day, and the lesser light to rule the night; the stars also. Gen. 1: 16.

We have already learned that light and heat began their work upon the first day of earth's history. We have studied, too, something about the great work that light and heat have to do.

However, three days passed in the first week of time before permanent light-bearers appeared in earth's firmament. We learn that it was upon the fourth day that God ordained certain heavenly bodies to be permanent light and heat-givers, and they appeared in the firmament above the earth.

The new world, the home God was preparing for us, must be forever provided with light and heat; and so upon the evening of that first fourth day, lights flashed in earth's dark firmament, and on the morning of that day the sun appeared for the first time.

What are these lights? What is this sun and what are these lesser lights that, since the creation of the earth, have been constantly at work just as God commanded?

Besides giving light and heat, what other work did the Creator give to these heavenly bodies? Gen. 1: 14.

Which is the greater light, and what did God give it to do? Ps. 136: 7, 8.

What were the lesser light and the stars to do? Ps. 136: 9.

Note Book Reqirement

On page 55 write a story of the first fourth day.

Lesson LXVII

The Rising and Setting of the Sun

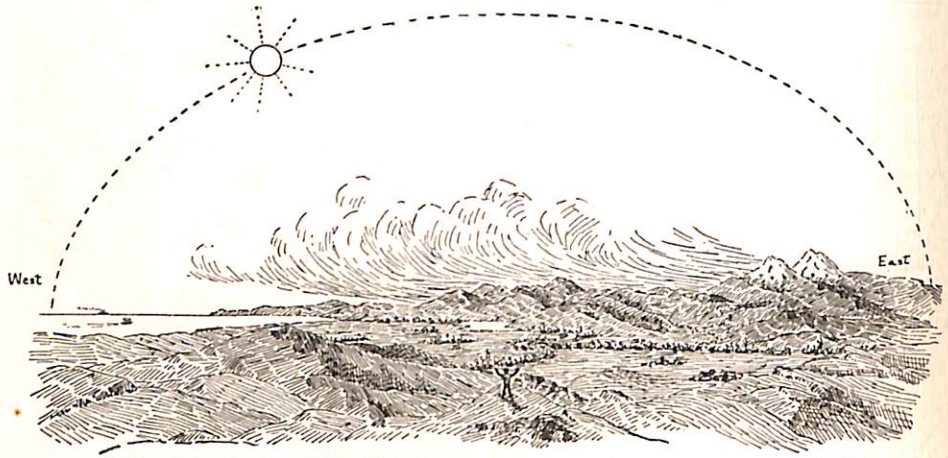
He maketh His sun to rise on the evil and on the good. Matt. 5: 45.

The sun seems to rise in the east every day, to move across the sky, and to set in the west. The moon does the same thing; and each one of the thousands of stars seems to rise and set every night.

But does the sun *really* move? The heavenly bodies do move, but not in the way they appear to us to be moving. The sun *seems* to rise above the horizon in the east, and at the end of the day appears to set in the west, but this is not so.

You have already learned that the earth is a sphere, and that as it turns once upon its axis, darkness and light follow each other upon its surface, making a day of twenty-four hours.

It is true that people once supposed the earth to be flat instead of round like a ball; and then, of course, if the earth were flat and still, these heavenly bodies must



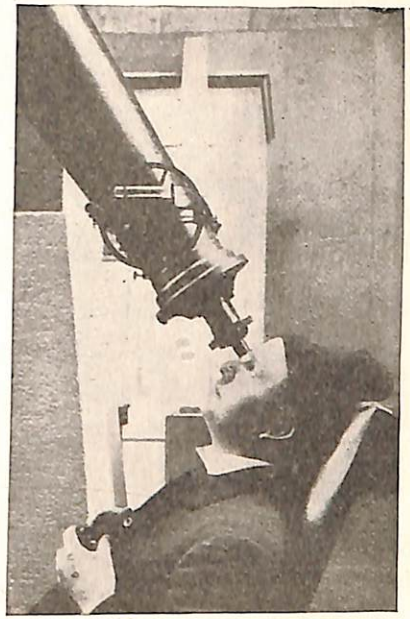
THE WAY THE SUN SEEMS TO TRAVEL FROM EAST TO WEST

move around the earth—every one of them—in twenty-four hours.

But astronomers have discovered a great many things about the shape and motions of the heavenly bodies. During the last three hundred years, by the aid of the *telescope*, these things have been studied and explained.

The motion of the earth upon its axis can be made plain to you with a candle and a ball. Let the candle represent the sun. Let the ball represent the earth. Let a knitting-needle running through the center of the ball represent the earth's axis. Upon this needle turn the ball

just as God, by His power, turns the world once in twenty-four hours. First, the light of the candle falls upon one side of the ball, and then upon the other side. In like manner the motion of the earth upon its axis causes light and darkness to follow each other upon the earth's surface.



USING THE TELESCOPE

The motion of the earth upon its axis being from west to east, the *eastern* horizon is always lighted first, and it is the *western* horizon that glows with day's last beams. Thus, according to the Creator's plan, our sun never fails to rise in the east and to set in the west.

Lesson LXVIII

The Sun and Its Family of Planets

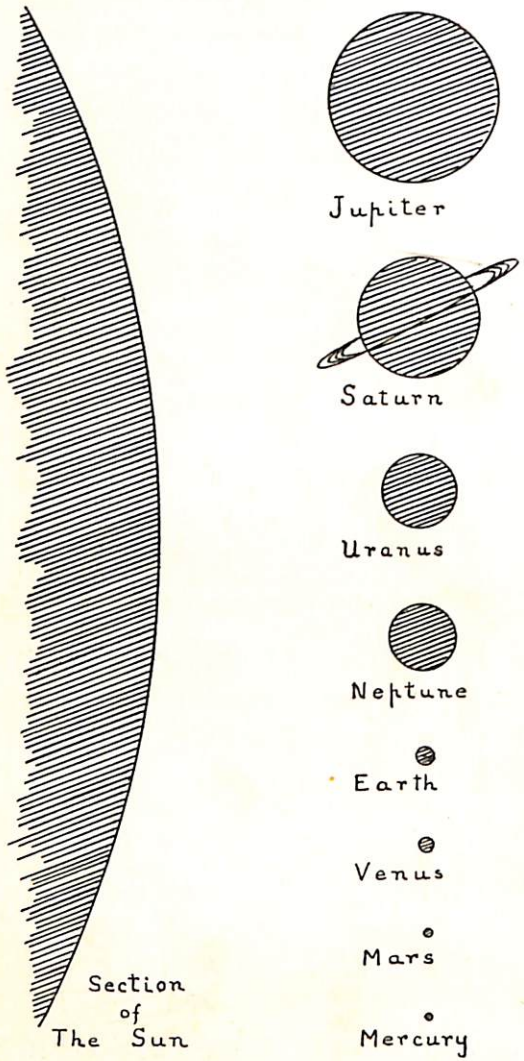
From the rising of the sun unto the going down of the same the Lord's name is to be praised. Ps. 113: 3.

Astronomers tell us many wonderful things about the sun.

It is a great, great sphere. It would take more than 1,000,000 earths to make a sphere as large as the sun. What an immense sphere!

It is because of its enormous distance from us that it

does not appear to be what it really is, for the sun is about ninety-three million miles from us. This means that an express train traveling one thousand miles a day would have to travel ninety-three thousand days, or two hundred fifty-eight and one-third years, to get to the sun. What a long, long trip that would be, —two hundred and fifty-eight years!



Comparative Size of the Sun and the Planets

This great sphere sends out its light and heat in all directions. It shines with a brilliant light,—so bright that we can not look upon it.

We all know that our world is constantly lighted by the sun's beams, and that we are warmed by its heat. We know that no life would be possible on our earth were it not for this light and heat.

Now, besides turning around on its axis, the earth is at the same time

traveling in a path around the sun. This path around the sun measures just a *year*. You will remember that God said, "Let them be for days and for years." We have already learned that it is the earth turning upon its axis that makes our day. Now we learn that it is the earth's journey in its path around the sun that makes the year.

There are other worlds traveling around the sun, besides our own. The path of some of these is nearer to the sun than ours, and some at a greater distance from it.

Those at the greatest distance can not be seen by us with the naked eye, but it is known that there are at least seven other worlds besides our own that travel in paths around the sun.

All these worlds, too, depend upon the sun for light and heat, just as does our earth, and so are said to belong to the same *Solar System*. *Sol* is a Latin word meaning "sun," and hence the Solar System means the system of the sun.

Note Book Requirement

On page 56 explain in your own words the movements of our earth: 1. How it turns upon its axis; 2. how it travels about the sun.

Lesson LXIX

The Stars

He telleth the number of the stars; He calleth them all by their names. Ps. 147: 4.

How many stars are in the sky? They appear as numberless as the grains of sand at one's feet, yet they are numbered, every one.

What are these shining, twinkling sparks of light made of? Men have studied them for hundreds and hundreds of years. Something has been learned of their motions, and of their immense distances from us and from one another. It is because they are so far away that they seem like bright, shining points in the sky.

THE PATH OF THE BIG DIPPER

There are in all about six thousand stars that one can see with the naked eye. However, as we see only half of the sky at once, it is never possible to see more than half of this number from any one spot on the earth.

Those stars that keep a fixed place among the heavenly host are called "fixed stars." They are really great, shining suns, but at enormous distances from our sun.

Stars that do not keep a fixed position, but appear to wander among the fixed stars, are called *planets*. The word *planet* means "wanderer." The planets are the worlds about which we studied in our last lesson.

The fixed stars shine by their own light, while the planets reflect the light of the sun, just as does the moon. Being nearer our earth, some of the planets appear brighter

to us than do the immense burning suns at their greater distance. And because they are nearer, astronomers have learned more about the planets than they have ever learned about the fixed stars.

With the telescope, the moons of the different planets can be watched and counted, and other interesting things have been discovered about which you will learn more hereafter.

Note Book Requirement

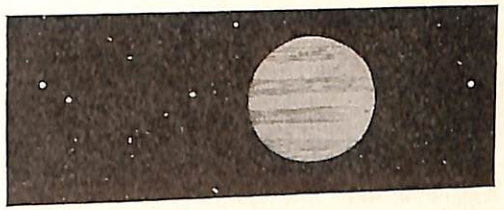
Write a story entitled, "What the Telescope Reveals," on page 58.

Lesson LXX

How Worlds Are Kept in Their Places

Upholding all things by the word of His power. Heb. 1:3.

We are told in Heb. 1:2 that God made the worlds by His Son. Then we do not need to wonder if there are other worlds besides our own. No, we are sure that our world is but one of many.

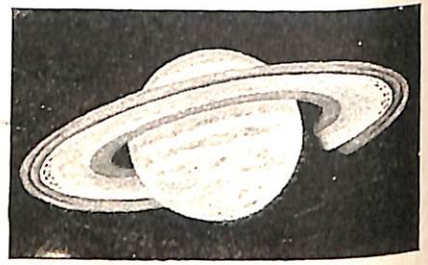

JUPITER AND HIS MOONS

Are these worlds inhabited? We believe they are, for God never created anything in vain. He took pleasure in forming our earth for a home for man. He delights in the beings whom He created.

Having completed the work of creating all these suns,

and worlds, and systems, God, the Creator of the heavens and the earth, who faints not, neither is weary, now upholds them by His power.

A string may be tied to a stone, and the stone may be swung about one's head. Just as the string holds the stone firmly, and the hand guides it in its path around and around as it swings, so God's power guides not only our earth, but every other planet about the sun.



SATURN AND HIS RINGS

And just as the planets are guided in their paths about the sun, so all the suns with their systems of planets are guided and upheld by the same power as they circle through space in their appointed paths.

"By Him all things consist." *Consist* means "to hold together." Men call that power which holds things together *gravity*. The *law of gravitation* is but one of God's laws. We shall learn more about it later.

"The spacious firmament on high,
With all the blue, ethereal sky,
And spangled heav'ns, a shining frame,
Their great Original proclaim:
Th' unwearied sun, from day to day
Does his Creator's pow'r display,
And publishes to ev'ry land
The work of an almighty hand."

CHAPTER VIII

WATER ANIMALS

(Scripture Basis, Gen. 1:20-23)

"And God said, Let the waters bring forth abundantly the moving creature that hath life."

Lesson LXXI

The First Animals

"God said, Let the waters bring forth abundantly the moving creature that hath life.

"And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that it was good.

"And God blessed them, saying, Be fruitful, and multiply, and fill the waters in the seas, and let fowl multiply in the earth.

"And the evening and the morning were the fifth day." Gen. 1: 20-23.

Questions

1. Upon what day were the first animals created?
2. Where were these animals to make their homes?
3. How were they created?
4. What brought forth the water animals?
5. Did God create many creatures to live in the waters, or did He create few?
6. What are the principal differences between plants and animals?
7. Why did the Lord create the plants before He created the animals?
8. Why did He create the air before He created either of these?
9. Why did God create light before He created the firmament?
10. For what purpose did God create all things? Rev. 4: 11.

Note Book Requirement

Write a story about the creation of the creatures pictured on page 65.

Lesson LXXII

How Water Animals Move and Breathe

O Lord, how manifold are Thy works! in wisdom hast Thou made them all: the earth is full of Thy riches.

So is this great and wide sea, wherein are things creeping innumerable, both small and great beasts. Ps. 104: 24, 25.

In order to live, all animals need light, heat, air, water, and food.

Those animals that are fitted especially for living in the water, can not live and move about if they are not in the water.

Should a man, dog, cat, or horse be placed under the

water for any length of time, what would happen? Why?

When a fish is taken out of the water, what is the result? Why?

What animals are fitted with organs for breathing under water? The breathing organs of a fish are called *gills*. As the water passes through the gills of the fish, the air that it holds among its particles is taken in by the fish.

STUDYING THE WATER ANIMALS

The water animals move about in the water by the use of fins, tail, or other organs especially adapted to movement in the water. Many of them are able to move very rapidly. Although graceful in movement, if they are taken from their watery home they appear very awkward and helpless.

It will interest you far more to study the wonderful creatures of brook and pond right where they live, than it will to study what some book may say about them. An aquarium in your schoolroom will furnish much fascinating study. You will especially enjoy one as you are studying the lessons of this chapter.

Study to make the aquarium homelike for the animal

life that you secure. Such creatures as live in ponds and quiet pools can live very comfortably in an aquarium. Be sure that you do not overcrowd your aquarium. Allow one gallon of water to a fish three inches long.

Put water plants in the water, that it may be kept pure. If the fish show by their actions that they are uncomfortable,—if they come to the surface and gasp for breath,—the water must be changed, some of the animal life removed, and more water plants found for the aquarium.

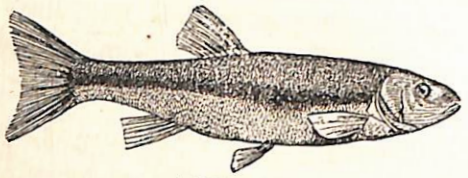
Lesson LXXIII

The Fin Family

The fishes of the sea shall declare unto thee. Job 12: 8.

What is more interesting than to watch the little minnows as they swim about in the brook, darting here and there as they choose?

Secure some minnows from the brook for your school aquarium, so that you may notice how they use their fins in swimming about. Look closely at the glistening scales, and observe how they are arranged.



A MINNOW

It seems wonderful that a fish can rise, sink, or remain at rest in the water. But the fish is adapted to the water, just as truly as the bird is adapted to the air, or as man and other land animals are adapted to the land.

The fish has an air bladder, which enables it to rise or sink. The fuller the bladder is with air, the lighter becomes the body; but the less air the bladder contains, the heavier the fish.

The fish has several fins located on different portions of the body. On the back is the *dorsal* fin. Almost directly below it is a pair of *ventral* fins. A little back of the ventral fins is the single *anal* fin. On the sides of the body, near the gills, is a pair of *pectoral* fins.

All the fins are used in directing the different movements of the fish.

The tail is called the *caudal* fin. It is used as an oar for pushing the fish forward.

The dorsal and anal fins are used to keep the body in a straight line when the fish moves forward.

The pectoral and ventral fins are used to balance the body, thus keeping the fish from tipping over on its side or back.

The breathing organs of the fish are arranged on each side of the head. When the fish breathes, the water enters the mouth, passes over the gills, and out again. The gills separate the air from the water, which unites with the blood of the fish, and in this way is carried throughout the entire body.

Water, to be well supplied with air, must be in motion, or must have water plants growing in it. In the fish-globe the water should be changed every twenty-four hours, or the fish will die.

The food of fish consists largely of worms, insects, and smaller fish.

Note Book Requirement

Write a description of the minnow on page 67.

Lesson LXXIV

Stationary Animals

Many simple animals closely resemble plants, and for a long time they were regarded by men as such.

One of the animals which was a source of dispute for a long time, was the sponge. It is now generally regarded as an animal.

THE SPONGE

Our common bath sponge is but the fleshy skeleton of the animal we are about to study.

If you examine a sponge, you will see that it is filled with holes of all sizes. During life, the little canals leading from these holes to the inner parts of the sponge are lined with tiny cells.

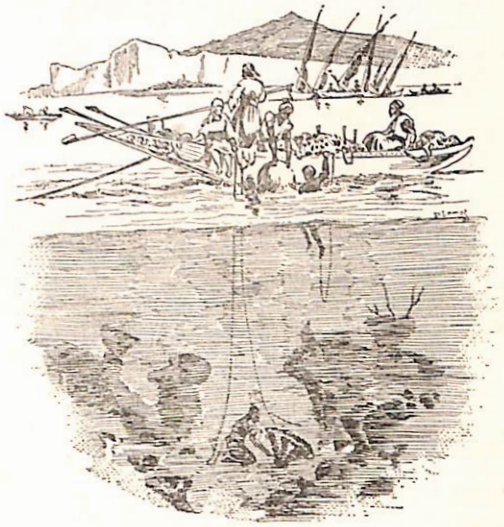
The cells are provided with little lashes. The moving of these lashes creates a current which constantly flows through the system of canals, and carries with it the food for the cells.

Each one of these little cells leads an independent life, yet it is closely related to the entire colony, and all taken together form the body.

The water is taken in at the holes at the side, flows through the canals, and out at the holes which you will notice on the opposite side.

A sponge colony has been likened to a submerged city, where the people are arranged along the streets in such a way that each may choose his food from the water as it passes.

Sponges are quite common in both tropical and temperate climates, and may be found in fresh as well as salt water. The varieties useful to commerce are nearly all found in warm waters. Off the Bahama Islands are the best sponge fishing grounds in the world. As much as a million pounds of sponges have been gathered there in a single year.



SPONGE FISHING

Sponges are obtained for market in different ways. The finest and largest are usually obtained by divers, who cut them carefully from the rocks to which they are attached.

The smaller and cheaper ones are simply torn loose by long rakes or tongs.

After they are gathered, they are washed, to free the skeleton from the jelly-like cells. They are then cured and prepared for the market. The mineral matter contained in them is dissolved by soaking them in some acid, which leaves the soft, fleshy portion used in the toilet.

Lesson LXXV

The Island Builders

No mention shall be made of coral, or of pearls: for the price of wisdom is above rubies. Job 28: 18.

Does it seem strange to have a lesson on the study of animals entitled "The Island Builders"? Have you never heard of those small sea creatures which, by their faithful labor, build islands in the sea?

The coral polyp is the animal that builds the coral rock with which you are familiar. It lives and works, for the most part, in tropical waters, thriving best in water less than two hundred feet in depth.

If you examine a piece of coral with a magnifying glass, you will find that it contains many little holes. In each of these holes lived a soft, jelly-like coral *polyp*.

The coral that you hold in your hand is the skeleton of a whole colony of coral polyps; for, like the sponge, the coral polyps live in companies, budding and branching much as does a plant.

Each little polyp possesses arms, or *tentacles*, which it thrusts out of the small opening in search of food. When at rest, the arms are drawn within.

The tentacles are called *feet* by some writers, and that is the reason the animal was named polyp, which means "many footed."

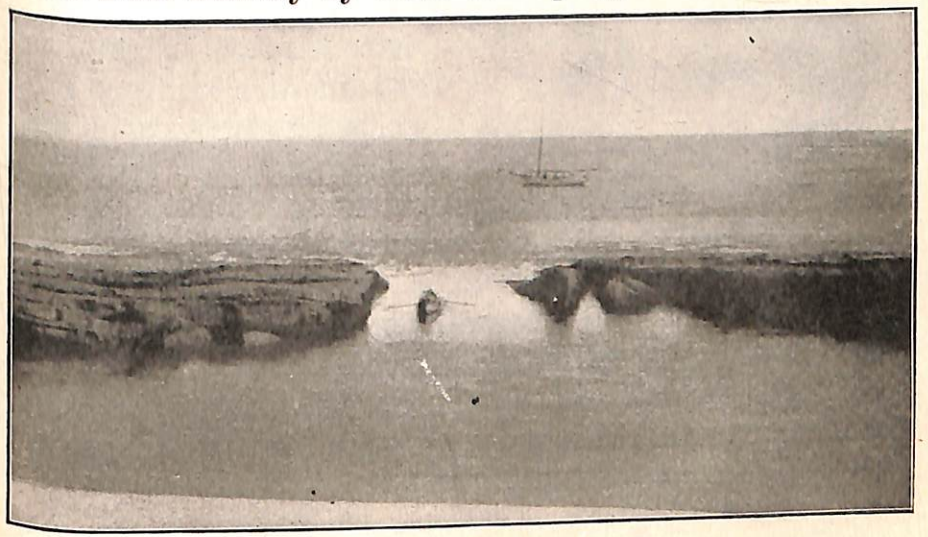
There are many different kinds of coral. Some coral patches resemble gardens of shrubs and various branching bushes, upon which appear blossoms of wonderful pink, and blue, and lavender. The petals, or leaves, of the

flower, however, are the arms of the animal waving about in search of food.

When these little flower-like creatures die, their skeletons form the foundation upon which another generation of polyps build their home. In this way the great coral rock rises slowly but steadily, higher and higher with each generation, until it reaches the surface of the water.

As the coral polyps can not live above water, they cease building upward as soon as they reach the surface of the water. Now, should the water lower in the sea or ocean, a coral island would appear above the waters. The action of the waves upon the rocky surface would in time produce soil. By and by the seeds which the birds might drop, and which the waters might carry to the lonely shores, would take root, and clothe the island with vegetation.

Many of the islands of the sea, which are now inhabited, were built entirely by these little polyps. Thus the coral



ENTRANCE TO A CORAL HARBOR

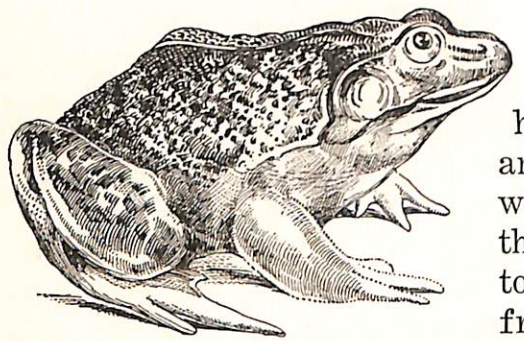
animals, although very small, do a great work, even to that of providing a home for man. Anciently, coral was considered of much value, and is mentioned along with pearls and rubies.

Lesson LXXVI

The Frog Family

The frog is a four-legged, slippery, slimy creature, which makes its home in low, marshy ground, and in small ponds and streams.

Frogs are excellent swimmers; but, unlike the fish, they are adapted to living on the land as well as in the water.



There are none of our water neighbors more harmless and interesting, and in the springtime, when the frost is leaving the ground, is a good time to study a little of the frog's history.

From seed to seed is the life of the plant, and now we shall find that from egg to egg is the life of the animal.

Frogs develop from eggs; but after the frog babies are hatched, they pass through a series of changes before they look like the parent mother frog.

The eggs, or *spawn*, may be found floating in jelly-like

masses in the water. They are often fastened to sticks and leaves, where they have been laid by the mother frog.

In about a month's time these eggs hatch into *tadpoles*. Sometimes a pond will be so full of tadpoles, or polliwogs, that the whole bottom of the pond may be one black, wriggling mass. In the tadpole stage, the frogs breathe by means of *gills*, which grow like plumes from each side of the head.

After a time the gills disappear, and the animal begins to develop hind legs.

Shortly after the hind legs appear, the fore legs begin to develop.

As the legs grow, the tail gradually shrinks away, and we soon have a full-grown frog, who may spend his time in the water or out of the water just as he pleases.

He is now provided with lungs, but as he has no ribs, he breathes by opening his mouth and swallowing the air. He breathes also through his skin.

The bullfrog, in his gay green coat laced with silver and gold, is well known in England and North America. He sings a double bass, and in the springtime is sure to make the evenings vocal with his thrilling notes.

The small cricket frog is found on plants

near the water, where his shrill, piping voice may be heard during the entire night in the summer.

The various members of the frog family have long tongues, which are fastened to the front part of the jaw and are free behind. These they can roll out, and by the aid of a sticky, gum-like substance with which their tongues are covered, any insect passing within reach can be snapped up without warning. Small insects are the principal diet of the frog.

During the winter, frogs bury themselves at the bottom of ponds.

Note Book Requirement

Page 66.

Lesson LXXVII

"The Whales Also"

There is that leviathan, whom Thou hast made to play therein. Ps. 104: 26.

What huge creatures they are! We have learned of tiny creatures who *build* islands, but here is one great monster—the largest creature that we know anything about now—himself *looking* like an island as he floats on the surface of the water!

Is the whale a fish?—No, for fish are cold-blooded; but here is a great creature, with plenty of warm, red blood, living in the water—*created* to live there!

Although provided with lungs to breathe air, he is able to spend much time under water. In fact, he is perfectly helpless on land, and will die if washed ashore.

How easily his fish-like body rolls aside the water! His horizontal tail, unlike that of the fish, is especially adapted to his needs, for with it he pushes himself upward and downward through the water.

As he rises to the surface, the air escaping from his nostrils spouts the water high over his head. Having secured a fresh supply of air, he dives below in search of food.

THE WHALE

His appetite is enormous, and he devours great quantities of fish, both large and small, seals, and even other whales. His great mouth opens so wide that a man can stand upright between the extended jaws. Some whales have teeth. One kind has horny plates instead of teeth. These plates are sometimes seven yards long, and it is said that there are often as many as seven hundred of them in the mouth of one whale.

His head occupies about one third of his length. His eyes are small, and his ears are tiny holes close behind the eyes. He has no neck. His fore limbs are two flat, oval-shaped paddles, and on the outside of his smooth, dark body there are no signs of any hind limbs. He has no use for limbs, you see.

Spread under his skin are several inches of fat. This layer of fat, or *blubber*, keeps him warm. It protects him from injury, and makes it easy for him to float.

Although so large a creature, he is very graceful in his movements. Whales are playful and affectionate, and live in groups. In the spring the mother whale devotes herself to her baby, which is born alive, and not hatched from an egg like all the other water animals that we have studied.

Whales are natives of cold climates. In the Arctic Ocean, about the mouth of the Mackenzie River, is said to be one of the best whaling grounds in the world. The oil, ivory, whalebone, and spermaceti which are taken from the whale, make whale fishing a valuable industry.

In the head of the whale, near the brain, is a cistern holding many gallons of spermaceti. This is valuable in commerce. Do you know for what it is used? What mention of the whale is made in the Bible?

Lesson LXXVIII

Reptiles

Behold, I send you forth as sheep in the midst of wolves: be ye therefore wise as serpents, and harmless as doves. Matt. 10:16.

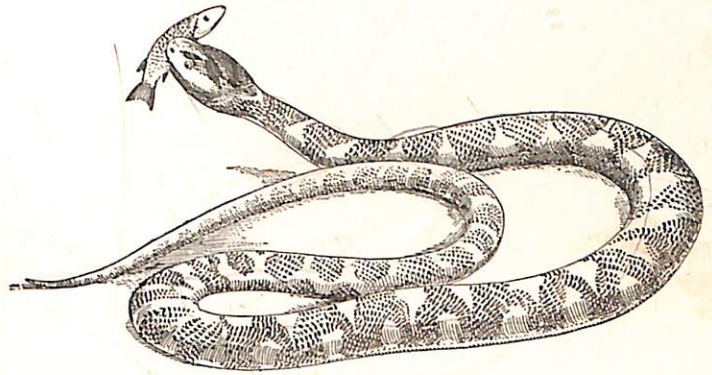
Reptiles are air-breathing animals, although some of the members of the family always live in the water. All reptiles are cold-blooded, and slow in their movements. As a rule, their bodies are covered with scales; they have the eyes of a bird, and their eggs resemble birds' eggs.

The snake is a member of the reptile family, and as we know it to-day, it has no legs and no breastbone. Doubtless this is the creature to whom the Lord said: "Thou art

cursed above all cattle, and above every beast of the field; upon thy belly shalt thou go, and dust shalt thou eat all the days of thy life." Gen. 3:14.

Not all snakes are poisonous. Some are even helpful to man, feeding, as they do, upon rats, mice, gophers, and rabbits. Yet the snake, whether poisonous or not, is dreaded by mankind in general.

A poisonous snake may be known by the shape of its head. If the head is somewhat rounded and oblong, the



A WATER SNAKE

snake is harmless. If the head is flat and triangular, the snake is poisonous.

Although the snake has no limbs, it is able to move quite rapidly. It travels by a free movement of the ribs and a general muscular movement of the body. How the snake could travel without feet was a puzzle to the wise man, for he says, "The way of the serpent upon the rock, I know not."

Those snakes that live in the water swim along by waving their body from side to side and using the tail as a rudder. They are very good swimmers and fishers, and are often very beautiful in their changing tints of red, purple, crimson, orange, and green. They make their holes

in the banks of the stream, below the low-water mark, and here they retire for a long nap when winter approaches.

Lizards and turtles are also members of the reptile family, and are very common animals. The turtle carries his house on his back, hence is never without a house and home. His shell is his protection from enemies. Instead of having no eyelids, the turtle has three. His eggs are soft-shelled, and are left in the sun until hatched.

Lizards are more like snakes than like turtles, being long and slender. They are provided with four legs, which are adapted to swift running and climbing.

The alligator and crocodile are the largest members of the reptile family. These animals live only in tropical climates, in such waters as the Nile and the Ganges. The study of these members of this family must be left to future times.

If you will keep your eyes open, you may find out for yourself many things about the snake, the turtle, and the lizard. All these creatures are dependent upon the Creator for their existence. They are subject to His control.

Questions

1. Did you ever see any eggs of reptiles?
2. Have snakes eyelids?
3. Is the mouth large, or small?
4. Do snakes make any vocal sound?
5. Did you ever find a snake cast?
6. Why do snakes cast their skin?
7. Did you ever make a pet of a horned toad? (They are perfectly harmless.)
8. Compare the snake with any other of the family of reptiles with which you are best acquainted.

CHAPTER IX

AIR ANIMALS

(Scripture Basis, Gen. 1:21, 22)

"Out of the ground the Lord God formed . . . every fowl of the air."

Lesson LXXIX

The Creation of Air Animals

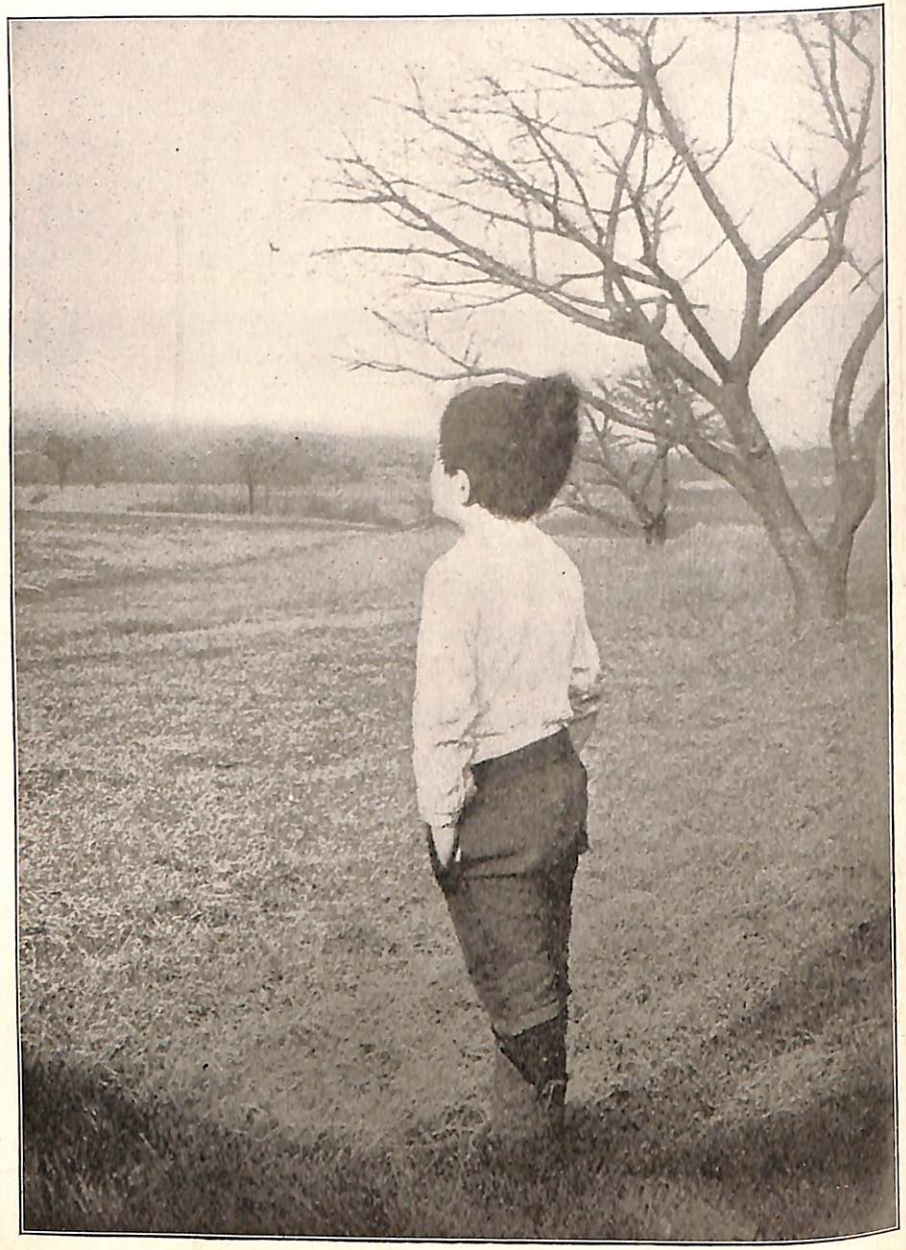
Behold the fowls of the air: for they sow not, neither do they reap, nor gather into barns; yet your heavenly Father feedeth them. Are ye not much better than they? Matt. 6:26.

"And God created every winged fowl after his kind; and God saw that it was good."

"Out of the ground the Lord God formed . . . every fowl of the air." Gen. 2:19.

"And God blessed them, saying, . . . Let fowl multiply in the earth." Gen. 1:22.

In Eden "birds of every variety of color and plumage



"BEHOLD THE FOWLS OF THE AIR"

flitted among the trees and flowers, while their mellow-toned music echoed among the trees in sweet accord to the praises of their Creator."

"He who upholds the unnumbered worlds throughout immensity, at the same time cares for the wants of the little brown sparrow that sings its humble song without a fear."

"Christ pointed His disciples to the lilies of the field and the birds of the air, showing how God cares for them, and presented this as an evidence that He will care for man, who is of higher consequence than birds and flowers."

Note Book Requirement

On page 69 copy a quotation from the Bible, and also one other quotation given in the lesson concerning the creatures of the air. Memorize these quotations.

Lesson LXXX

How to Study the Birds

I know all the fowls of the mountains. Ps. 50: 11.

In the early springtime, when our feathered friends first begin to appear, is the right time to take up the study of birds. One should make the acquaintance of as many of the feathered folk as possible every spring.

The best time to observe the birds is in the morning at sunrise, and in the evening at sunset. Search out the favorite haunts of the birds of the neighborhood, make friends with them, and listen to what they tell you. Job 12: 7.

Study their habits. Learn what you can of their nests and their eggs.

Observe their color, their manner of flight, and learn to know them by their song.

Discover whether they feed upon fruit, grain, or insects; and whether their disposition is nervous, quarrelsome, or good-natured.

RED-WINGED BLACKBIRD

Observe whether the bird leaves for the winter, and if so, make a note of the date of its departure.

Study the birds that remain during the winter, and make a list of them. How do these birds get along during the winter months, and what do they find for food?

Provide yourself with a good note book and pencil, so that you may record what you see. Tie the pencil to the note book, so that you may always have it at hand. If the note book is long and narrow, it will slip into a boy's vest pocket. A girl may fasten it to her belt.

Keep in your note book a record of all that you learn in observing the birds, and every spring you will have opportunity to add to your store of information.

Requirement

Fill out the following table for all the birds that you see in your neighborhood this spring:

1. The number of bird studied.
2. The date of observation.
3. Where seen.
4. Its colors.
5. Its wings.

6. Its tail.
7. Its bill.
8. Its feet.
9. Its flight.
10. Its nest.
11. Its eggs.
12. Its food.
13. Its disposition.
14. Its song.
15. Its departure.

Note Book Requirement

Compare the bills of the following birds: sparrow, robin, snipe, humming-bird, woodpecker, eagle, and duck. Page 70.

Lesson LXXXI

A Study of Birds' Homes

If a bird's nest chance to be before thee in the way in any tree, or on the ground, whether they be young ones, or eggs, and the dam [mother bird] sitting upon the young, or upon the eggs, thou shalt not take the dam with the young. Deut. 22: 6.

BALTIMORE ORIOLE AND YOUNG

Where it is seen in summer, and where it brings up its family, is a bird's real home. It proves itself a real home lover by returning to the same place year after year. Here it builds its nest in the same old way, using the same materials that its forefathers used, and teaching the young to live and enjoy life just as it was taught to do.

What a great variety of materials are used by birds in building their nests! But each bird has his own favorite kind, and understands exactly how to work it into a home. Some are made of leaves, grass, and mud, and lined with grass. Did you ever find such a nest? Other birds use hay, hair, twine, wool, sticks, thread, and feathers.

HOME OF AN ORIOLE

The kind of material we find the nest made of, depends somewhat upon where it is built. A bird who builds upon the ground, in meadow or hayfield, will use grass, leaves, and twigs. When birds build in trees or bushes, they understand how to weave the leaves and twigs together with coarse hair and stout grasses.

Other favorite places for nests are in and about buildings.

Sometimes nests are built *in* the ground. The petrel, an ocean bird, builds its nest underground on islands that are hard to reach by man.

Some birds build their nests in hollow stumps. Others build on old rail fences.

There are birds that will build their nests in small houses made for them. If you would like to make the acquaintance of these birds, put up in your garden a bird-

house "to let," and if tenants move in, they will pay you for your kindness with their sweet songs.

In your study of birds, do not forget that Jesus says of the sparrows, "One of them shall not fall on the ground without your Father." Matt. 10: 29.

Questions

1. How long after the birds return before they begin building their nests?
2. Name birds which build their nests inside of buildings.
3. Those which build under the eaves of buildings.
4. What birds build their nests on the ground?
5. Name birds that always build in low bushes.
6. What birds build in hollow stumps?
7. Have you ever heard of more unusual places for building than are mentioned in your lesson?
8. Are birds' nests alike in shape? Draw some shapes.
9. Do birds rear more than one brood in a season?
10. Who lived in this world at one time, and was more homeless, even, than the birds? Matt. 8: 20.

Note Book Requirement

Study the birds' feet on page 71, and tell for what each is fitted.

Lesson LXXXII

The Scratching Family

O Jerusalem, Jerusalem, thou that killest the prophets, and stonest them which are sent unto thee, how often would I have gathered thy children together, even as a hen gathereth her chickens under her wings, and ye would not! Matt. 23: 37.

The scratchers are a very large family of fowls, some of which are tame and some wild. They are land fowls,

and as they all do some scratching to get a living, they go by the name of the *Scratching Family.*

The hen is a member of this family, and being so common, may easily be studied. The hen and rooster may fly or perch, but the ground is their home. Their short, round wings are good for flying short distances only. And the hen would be as much out of place in the water as would the fish on dry land.

A short, stout beak, with the upper jaw turning its sharp point a little down over the under jaw, makes a splendid instrument for picking. What could the hen do with the bill of a duck?

The leg is of medium length, and set near the middle of the body. It is well suited to running. The foot has four toes. The hind toe is a little higher up than the three front toes, and is long enough to use in perching. The toes are nearly separated, instead of being webbed. What could the hen do with a foot like the duck, when she has to scratch to get a living for herself and her large family?

THE SCRATCHERS

The tame relatives of the hen are the turkey, guinea-fowl, and peacock.

The hen and the rooster make life pleasant by their cackling and crowing, the turkey gobbler by his gobbling, the guinea-fowl by its brassy clicking, and the peacock by its peculiar crying.

The quail, prairie chicken, partridge, grouse, and sage hen are wild members of the scratching family. Are you acquainted with any of these relatives of the hen?

The scratchers lay from twelve to twenty eggs before sitting. Three or four weeks are required for hatching. They build their nests on the ground, of dried sticks and grass, often lining them with feathers from their own breasts.

The hen was spoken of by Christ when He desired to express His love for Israel. Even as a hen gathers her chickens under her wings in time of danger, so Christ will gladly shield His people.

Questions

1. How old is the hen?
2. Where is it spoken of in the Bible? By whom? For what purpose?
3. Where is the home of the hen?
4. Describe her bill, wings, legs, feet.
5. For what are the feet adapted? Bill? Legs?
6. Of what value would be the duck's bill and feet to the hen?
7. To what family does the hen belong?
8. Name the tame scratchers. Wild scratchers.
9. Where do the wild scratchers build their nests? Out of what material?
10. Give the number of eggs and the time for hatching.

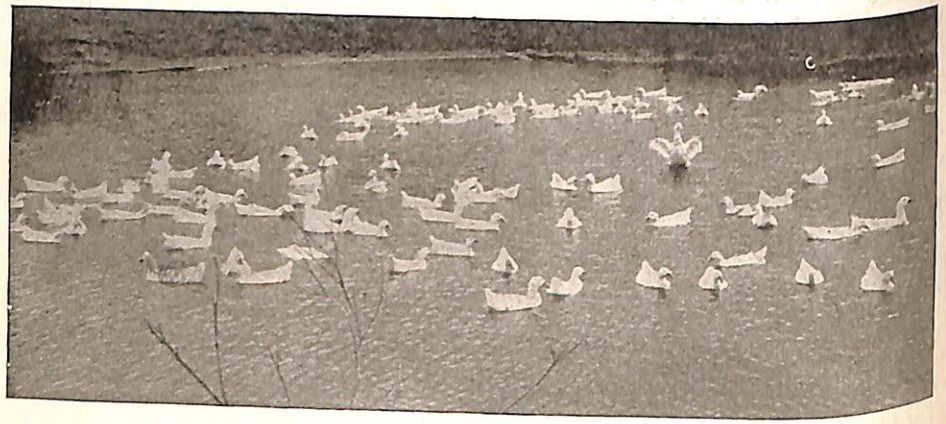
Note Book Requirement

On pages 72 and 73 describe three members of the scratching family.

Lesson LXXXIII

The Swimming Family

The duck is another domestic fowl, but quite different from the hen, which we studied in the previous lesson. Compare the bill, legs, feet, and wings of the duck with those of the hen, and you will see that there is a great difference. Why?—Because they live a different life. The



DUCKS

duck is a water bird, while neither the hen nor her relatives are made for the water.

Notice how the duck wabbles along. Its feet are located so far back that it is difficult for it to walk at all. If it attempts to run, it is liable to fall over. Its feet are so constructed that it can not perch, neither can it scratch like a chicken.

The three front toes of a duck are joined together by a thin membrane. The foot thus webbed makes a splendid paddle, which can propel the body easily and rapidly through the water.

By examining the body carefully, you will see that it is shaped like the keel of a boat.

The duck secretes an oily fluid, with which it oils its feathers, thus keeping the water away from its body.

Watch a race between chickens and ducks when they are called to be fed. The chickens far outstrip the ducks in the race. The feet of the duck are far back on the body, like the paddle-wheel of a steamboat.

The food of the duck is found largely in the shallow, muddy bottom of streams and ponds. With its large, flat beak, which is fitted with plate-like strainers, it retains the food and rejects the mud and water.

The wings of the duck are long, and are well adapted to long and continuous flight.

The water forms a protection to the duck; for when in danger, it may swim rapidly away, or dive and swim beneath the water for some distance.

The duck is only a single member of a large family of birds, most of which are wild. The goose belongs to the same family. On account of these birds being great waterfowls, and moving about so easily and rapidly in the water, they are spoken of as the *Swimming Family*.

Besides the goose and swan, which are domestic fowls, there are many wild swimmers. All of these have webbed feet, and are more thoroughly water birds than are the duck and the goose.

The pelican is a swimming bird. Pelicans have their feet still farther back than has the duck, and can not stand up except in a perpendicular position.

The swimmers, like the scratchers, lay several eggs, but make their nests on the ground near the water. They construct them of dry grass, and line them with soft, downy feathers from their own bodies.

Questions

1. Where is the home of the duck?
2. What is the general shape of the duck's body?
3. Where on the body are the legs located?
4. What purpose do the legs and feet serve?
5. How is the bill of service?
6. What keeps the duck from being water-soaked like the hen?
7. Where does it get its oil?
8. What tame relatives has the duck? Wild relatives?
9. What is the family name of these birds?
10. Of what value are swimmers?
11. How many eggs do they lay?
12. Where do they build their nests? Of what materials?

Note Book Requirement

Compare the duck and the goose, page 74.

Lesson LXXXIV

The Wading Family

The waders are a large and interesting family of birds, and examples of them for study may be found almost everywhere.

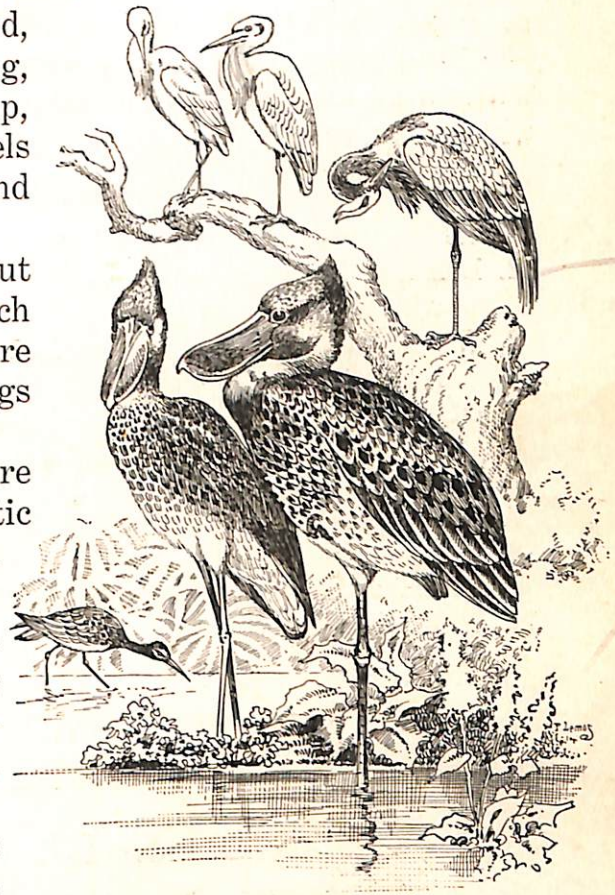
The snipe is a rather common bird, which belongs chiefly

to North America and Europe. It is found along the shores of ponds and small streams.

In searching for food, the snipe thrusts its long, soft bill into the damp, marshy ground, and feels around for worms and other small creatures.

In order to wade out into the water and catch its prey, these birds are provided with long legs and long bills.

The wading birds are not among the domestic fowls, but are found wild all over the world. Some of the more common waders are the plover, sandpiper, woodcock, heron, crane, flamingo, and stork.



WADERS

No doubt you have seen the large white crane, called the whooping crane, because of the loud, whooping noise that it makes. If you have not seen it, probably you have heard it, for its scream can be heard for several miles.

The stork is a very large member of the wading family. In Holland, where storks are most abundant, they are

greatly prized by the people; and it is thought that they bring good fortune to the person who is kind to them.

They build their nests in cities, on the tops of houses and chimneys. The nest consists of sticks, and is lined with twigs and dry grass. They lay three or four bluish-white eggs, and it requires thirty days to hatch them.

Questions

1. Where would you go to look for a snipe?
2. Describe the snipe as to the shape of its bill, and the use which it makes of it.
3. What can you say of its legs? Why are they of such great length?
4. Of what does the snipe's food consist?
5. Compare the snipe with the duck and hen.
6. Name the relatives of the snipe.
7. What member of the wading family is very noisy?
8. What member of the family is especially prized in Holland?
9. Describe the nest of the stork. The eggs.
10. What time is required for them to hatch?

Note Book Requirement

Describe a wading bird, page 75.

Lesson LXXXV

The Plundering Family

Doth the hawk fly by thy wisdom, and stretch her wings toward the south? Job 39: 26.

The chicken hawk is so called because it is so fond of chickens; and for this reason chickens are greatly terrified when they see a hawk sailing about in the air.

The hawk is quite a large bird, and is able to carry off a common chicken with ease.

Did you ever notice its manner of catching its prey? You will see it sailing about in circles in the air, as if it were paying no attention to anything on earth. Many times it is up so high that it can not be seen readily by the domestic fowls, but all of a sudden down it swoops as straight as an arrow, and catches one of its surprised victims. Away it flies with it to some tree, there to have a feast or perhaps to divide it up among several of its children, who have been waiting some time for something to eat.

A HAWK'S NEST

The note of a hawk is a shrill, piercing whistle.

These birds are great flyers, and will remain on the wing for hours and hours, sailing about in circles.

The hawk does not feed entirely upon domestic fowls, for often it flies along close to the ground, especially over marshy ground, in search of mice and rabbits.

The members of this family of birds have strongly-hooked bills, which are especially adapted for seizing and tearing its prey.

The feet of the hawk are large and strong, and with these it can carry a great weight. The claws on the toes are very sharp, and can easily penetrate the flesh of animals which it uses for food.

The hawk builds its nest in large trees, up some distance from the ground. The nest is a crude affair, and is usually made of sticks and twigs. The hawk does not make a very soft, downy bed for its children, but teaches them early to live a life of hardships.

The hawk belongs to a large family of birds, which are sometimes called the "Lions of the Air." Others call them plunderers, because they rob other birds, often taking the young of smaller birds before they are able to leave the nest.

Besides the chicken hawk, there are many other kinds of hawks. The sparrow hawk is so named because it lives upon small birds, such as the sparrow. Its looks and habits are much the same as those of the chicken hawk.

The plunderers are wild birds, but some of them can be readily tamed. Some of the common plunderers, besides the hawk, are the eagle, owl, and vulture.

Questions

1. By whose wisdom does the hawk fly?
2. Describe the manner of its flight.
3. How is it enabled to catch the domestic fowls?
4. Describe the note of the hawk.
5. Upon what besides chickens does the hawk live?
6. Describe the bill of the hawk.
7. For what is it especially adapted?
8. Describe the feet and toes, and tell for what they are adapted.
9. Describe the hawk's nest.
10. What names are given to this large family of birds to which the hawk belongs?
11. Name some of the near relatives of the hawk.
12. What does Solomon say he does not understand about the eagle? Prov. 30: 18, 19.

13. At whose command does the eagle mount on high? Job 39: 27.

Note Book Requirement

Describe the sparrow-hawk, page 76.

Lesson LXXXVI

The Climbing Family

Every boy and girl is familiar with the bird called the woodpecker. There are about twenty-five different kinds of woodpeckers, but the most common is the red-headed woodpecker.

You will find the redhead, as it is sometimes called, in orchards and cornfields, where it feasts on ripe cherries and apples, and the rich, milky young corn.

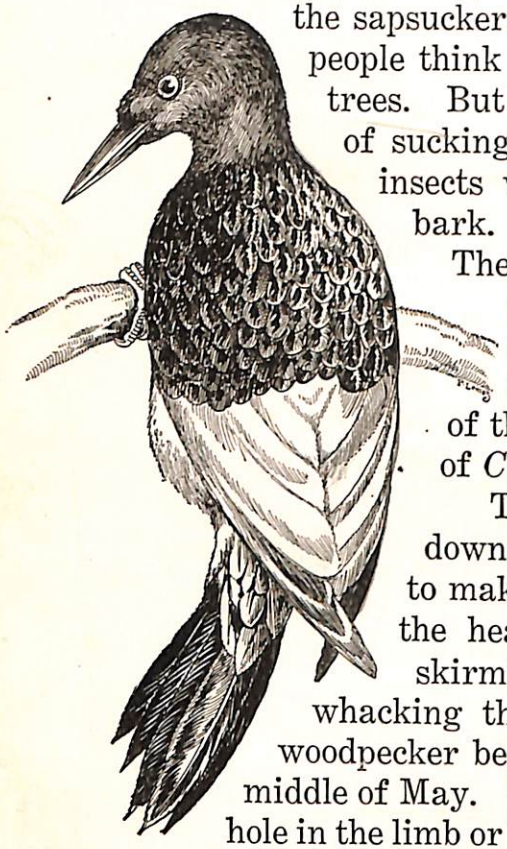
The woodpecker is a rather clumsy bird. It is unable to light on the limb of a tree crosswise, but always lengthwise. Two toes extend backward and two forward, enabling it to take a firm hold with its feet. The woodpecker climbs up and down the trees, picking insects out of the bark.

Some look upon the woodpecker as an enemy to the farmer, because it helps itself to the fruits and grains which the farmer raises. But were it not for the faithful work of the woodpecker in killing the insects and worms, which would destroy the fruit trees, the farmer would not have his trees so richly laden with delicious fruit. Surely the farmer can afford to give this industrious bird its board for the work it does for him.

Besides the redhead, we have the downy woodpecker, living in parks and in shade trees around houses; the Arctic three-toed woodpecker, living in northern North

America; the California woodpecker; the ivory-billed woodpecker of the Southern States; and the flicker, or golden woodpecker, so common throughout the United States.

A near relative of the woodpecker is a bird known as the sapsucker. It is so called because many people think that it sucks the sap from the trees. But it is now known that, instead of sucking the sap, it is picking out the insects which it finds underneath the bark.



The woodpecker represents a large family of birds whose feet are so made that they can climb about very readily. On account of this they have received the name of *Climbers*.

The Climbers can run up and down trees like squirrels. It seems to make very little difference whether the head or tail is foremost. They skirmish to the right and to the left, whacking the bark with their bills. The woodpecker begins to build its nest about the middle of May. The nest is formed by making a hole in the limb or body of some tree. No material is taken into the cavity, but the nest is made of the small pieces chipped from the inside of the hole. In this are placed six white eggs. These are hatched in about three weeks.

About the middle of September the birds start for the South. They travel in the night, stopping during the day to eat and sleep.

Questions

1. Why is the bird in this lesson called the woodpecker?
2. What is the favorite haunt of the woodpecker?
3. What is its food?
4. How does the woodpecker's manner of perching differ from that of other birds?
5. Describe its feet and toes.
6. For what purpose does the woodpecker climb up and down the trunks of trees?
7. Is the woodpecker a friend, or an enemy, of the farmer?
8. Name other woodpeckers, giving their native homes.
9. What other bird closely resembles the woodpecker?
10. What is the name of the family to which the woodpecker belongs?
11. When does the woodpecker begin to build its nest?
12. How is it made?
13. How many eggs does the woodpecker lay?
14. What time is required to hatch them?
15. When does the woodpecker leave for a warmer climate?

Note Book Requirement

On page 77, describe a member of the climbing family which you have seen in your neighborhood.

Lesson LXXXVII

The Singing Family

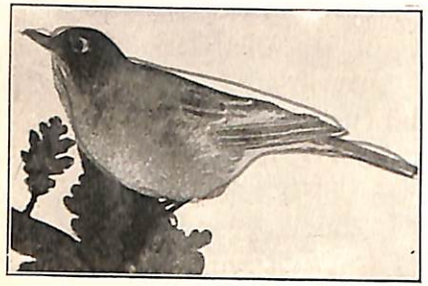
The time of the singing of birds is come. Song of Solomon 2: 12.

The American robin is one of our well-known songsters. It goes by the name of robin redbreast.

It is fond of the society of men, and will follow close

behind the plow, eating the freshly turned up worms and insects. For a month or two it feeds upon strawberries and cherries; but usually its diet consists of worms and insects. The robin may be called the friend of man, since it protects our vegetation from harmful insects.

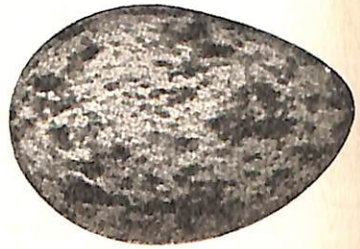
The robin is one of the earliest birds of spring, coming as early as March or April, and is one of the last to leave us in the fall. No doubt you have often said, "Spring will soon be here, for I heard a robin sing this morning."



THE ROBIN

The robin's song is sweet, hearty, and melodious. It is often called "the bird of the morning," because it sings its principal song at the early morning hour. Even before the sun rises it flies to the top of some tall tree, and with its sweet song heralds the coming of day. Before we are up, the parent birds have taken their bath, fed the children, and are ready to greet us with their good-morning song.

The robin builds its nest on some horizontal limb or in the crotch of some tree, or it may be in a fence corner, or in the porch of a house.



ROBIN'S EGG—NATURAL SIZE

The nest is made of leaves or dry grass, held together with mud. From four to six bluish eggs are laid, which hatch in four weeks.

The robin represents a very large family of birds, called

the *Singers*. The most noted of these singers are the thrushes and the mocking birds.

The hermit-thrush, as you may guess from its name, lives far away from the dwellings of men, in the deep, silent forest.

The wood-thrush is one of the sweetest of singers. It lives in the woods, and likes to be heard rather than seen. It sings most sweetly when the weather is bad, but rain or shine, wet or dry, it sings and sings. I wonder if we could not learn a good lesson from the thrush in this respect.

The mocking bird is a wonderful songster. Not only can it sing sweetly, but it has the remarkable power of imitating all the birds of the field, forest, and garden in one broken song.

But the greatest of all singers is the nightingale, which lives in England. At midnight, when all is still, the nightingale sings its sweet song. Its music, although melodious, is very sorrowful.

The singers are a large family. To this belong the bobolink, oriole, wren, blackbird, sparrow, chickadee, phœbe, and kingbird. But we shall learn about these some other time.

Questions

1. Of what very large family is the robin a member?
2. What birds in this family are the most noted singers?
3. Where may the robin be found in the early springtime, when the farmers are plowing?
4. In what way is the robin a friend to man?
5. What does the return of the robin from the sunny South herald?
6. What time in the year does it return?
7. What time does it leave?
8. What can you say of the song of the robin?

9. At what time of day does it sing its principal song?
10. When do the robins build their nests?
11. Where do they build them, and out of what material are they made?
12. How many eggs do they lay? How much time is required for them to hatch?
13. Describe the hermit-thrush.
14. Describe the wood-thrush.
15. What lessons may we learn from it?
16. Describe the mocking birds.
17. Which of all birds is the greatest singer?
18. Where does it live?
19. At what time does it sing its sweetest song?

Note Book Requirement

Write a story about a songster of your neighborhood.

Lesson LXXXVIII

The Running Family

Gavest thou the . . . wings and feathers unto the ostrich? Job 39: 13.

The birds which we have studied so far are winged creatures, which are able to fly about in the air.

But there are some birds that never leave the ground, because they have very small wings, which are not able to support their bodies.

The ostrich is an example of this kind of birds. Its breastbone is flat instead of being keeled, as is that of most flying birds. The ostrich has great strength in its legs, and can outrun the fleetest horse.

These birds live in the dry, parched deserts of Africa. The female lays her eggs in the sand, with which she

covers them until they are hatched. These eggs are very large, some of them weighing fully three pounds.

The nest is scooped out in the sand, and in it several birds may deposit their eggs. The males do the sitting, and are more affectionate to the young than are the females. During the heat of the day the nest is left to be kept warm by the sun.

The ostrich has the queer habit of eating stones, bits of

BABY OSTRICHES

iron and glass, pieces of leather, and almost anything that happens to be lying about.

A long time ago the Lord gave to Job a description of the ostrich and its habits: "Gavest thou . . . wings and feathers unto the ostrich? which leaveth her eggs in the earth, and warmeth them in dust, and forgetteth that the

foot may crush them, or that the wild beast may break them. She is hardened against her young ones, as though they were not hers: her labor is in vain without fear; because God hath deprived her of wisdom, neither hath He imparted to her understanding. What time she lifteth up herself on high, she scorneth the horse and his rider." Job 39: 13-18.

The African ostrich has two toes on each foot, while those living in South America and Australia have three. The African ostrich, when full-grown, is about seven feet high, and weighs from a hundred to two hundred and fifty pounds.

These birds are sometimes kept in very large herds upon what is called ostrich farms. The feathers of the ostrich are of great value in commerce. In California there are several large ostrich farms.

The value of the ostrich consists almost wholly in the beauty and value of its rich plumage. The young birds are plucked at six months of age, and about every six or nine months thereafter. The feathers of a grown bird, at a single plucking, have sold for one hundred and fifty dollars.

Questions

1. When the Lord created the birds, where did He design they should live?
2. Have the birds we have studied so far the ability to move about in the air?
3. What bird in this lesson is unable to fly?
4. What kind of breastbone has the ostrich?
5. What kind of breastbone have the birds which you have already studied?
6. Which kind of breastbone is the best for flight?

7. Where is the home of the ostrich?
8. What can you say of the size of the ostrich?
9. How does it compare with the horse in speed?
10. Where in the Bible have we a description of the ostrich and its habits?
11. In what way does the African ostrich differ from those in Australia and South America?
12. What is the height and weight of a full-grown ostrich?
13. Are the wings of any value to the ostrich?
14. In what does the chief value of the ostrich consist?
15. Describe the nest of the ostrich.
16. Which is more affectionate, the male or the female bird?
17. What queer habit has the ostrich?
18. How old is the ostrich when its feathers are first plucked?
19. How often are they plucked afterward?
20. What is sometimes the value of a single plucking of a full-grown bird?

Note Book Requirement

Outline a story for this bird family, page 79.

Lesson LXXXIX

The Dove

Be ye . . . harmless as doves. Matt. 10: 16.

The dove has a very ancient history. We read in the Old Testament Scriptures that the dove was one of the birds which Noah sent out of the ark to learn the state of the waters. The dove returned, bringing an olive leaf in its mouth, which told Noah that the waters were gone from off the earth.

The dove was also used in the system of offerings which

the Lord gave to the children of Israel. When too poor to offer a lamb, the Lord said they should offer a dove; so when Christ was presented at the temple, His parents, being very poor, offered a dove in sacrifice instead of a lamb.

The dove is a very harmless creature, and is well fitted to represent the gentleness and innocence of Christ. It is used as an emblem of peace.

MOURNING DOVE

When Christ was baptized in the Jordan by John, the Spirit of God descended upon Him in the form of a dove.

Tame doves build their nests in houses made for them. The nest is built of dried grass and similar materials.

Mourning or turtledoves, are smaller than the barn dove, and are usually found in pairs. They spend most of their time in fields and along the road. They build their nests on stumps or in low trees. These consist of a few sticks placed carelessly together, and are simple affairs, not being lined with any soft materials.

The turtledove is noted for its loving disposition, and for its devotion to its mate. It is a native of Europe, and lives in some parts of Asia and Africa. In America it is given the name of mourning dove, from its plaintive note.

The food of the dove consists of grains and seeds, together with the tender leaves of grasses and vegetables.

Interesting relatives of the dove are the wild pigeon and the carrier pigeon.

Note Book Requirement

On page 79 write a story of a tame pigeon.

Lesson XC

Review

1. Of what did God create the birds?
2. What other animals were created at the same time?
3. Name some of the water animals which you have observed and studied.
4. What have you learned about God from this study?
5. Name some of the birds you have observed and studied.
6. To what great families do these belong?
7. What have you learned about your Creator in your study of birds?
8. What does Job say that the fowl and the fish are able to do? Job 12:7, 8.
9. Does God control the birds? Ps. 78:26-28.
10. What command did God once give the ravens? 1 Kings 17:2-4.
11. Where do the birds obtain their food? Ps. 147:9.
12. What bird is used as a symbol of peace?
13. What bird "scorns the horse and his rider"?
14. In what way did God show His love for the beautiful in constructing birds? Job 39:13.
15. Did the Lord, when He created birds, intend that they should be subject to man? Gen. 1:26.
16. Are the birds and animals accountable to God for what they do, the same as man?
17. What part will the birds have in the great battle that is to be fought by all the nations of the earth? Rev. 19:17-21.
18. In what respect are the saints to be like the birds? Do the angels fly? Give text.

CHAPTER X

THE LAND ANIMALS

(Scripture Basis, Gen. 1:24, 25)

"And God said, Let the earth bring forth . . . cattle, and creeping thing, and beast."

Lesson XCI

The Creation of the Land Animals

Every beast of the forest is Mine, and the cattle upon a thousand hills. Ps. 50: 10.

At the close of the fifth day of creation, the waters were teeming with life, and here and there above the earth flitted the fowls of heaven, beautiful in plumage, filling the air with their melody. But upon the dry land there were no moving creatures.

The work of the sixth day was to complete the creation

of all animal life. Angels and happy beings in other worlds waited with interest to see creation's complete picture.

And God said: "Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth after his kind: and it was so.

"And God made the beast of the earth after his kind, and cattle after their kind, and everything that creepeth upon the earth after his kind: and God saw that it was good.

"And God said, Let Us make man in Our image, after Our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth." Gen. 1: 24-26.

"And God saw everything that He had made, and, behold, it was very good. And the evening and the morning were the sixth day." Gen. 1: 31.

Questions

1. Name some of the common beasts.
2. Name familiar creeping things.
3. Out of what were these all made?
4. How were they created?
5. In what respect are they unfitted for a home in the air? In water?
6. In what ways are they adapted to a home on the dry land?
7. What had the Creator caused to appear on the dry land to sustain the lower animals? Gen. 1:30.
8. To whom did God give dominion over all the creatures that He made?
9. Should we study them? Why? Job 12: 7, 9, 10.

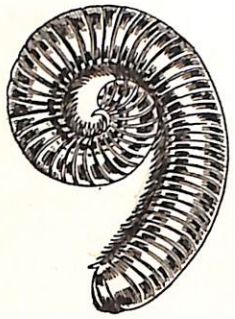
Lesson XCII

The Many-Footed Creepers

Every creeping thing that creepeth upon the earth shall be an abomination; it shall not be eaten. Lev. 11:41.

In the study of the land animals, we shall notice first the many-footed creatures. Of these there are two kinds, those which creep all their lives, and those which creep only a part of their lives.

By far the largest number of creeping animals are those which hatch from the eggs of insects. They are sometimes called worms, but this is not correct. They are baby insects. These worm-like babies, after much eating and a long sleep, waken to find that they are no longer many-legged creepers. A true insect has but six legs, and it leads a very different life after it leaves the creeping stage.



THE MILLIPED

Other creeping creatures, as the milliped and centiped, are creepers all their lives. Unlike the baby insect, these creatures do not lose their many legs and feet with which they hatch from the egg.

The milliped, or "thousand-legged worm," as it is commonly called, has a great many legs. It is from three to six inches long, and brownish-red in color. It lives in great numbers in timbered countries, and may be found crawling around on the ground and over old stumps and logs, or at rest under stones and logs.

If you touch one of them, it quickly winds its body up into a coil, and pretends to be dead. If left undisturbed for

a few minutes, it will, little by little, unfold itself, and start again on its journey.

The centiped is like the milliped in that it has many feet. It is not as large as the milliped, and has a more flattened body. These creatures live about dwellings, and feed upon small animals.

Both the centiped and the milliped are harmless, and yet the large centiped of the tropical regions, sometimes a foot long, is able to make severe and even dangerous wounds.

Both the millipeds and the centipeds have bodies which consist of many ring-like parts. Each ring of the centiped has two legs, while each ring of the milliped has four.

Questions

1. Into how many classes are the land animals divided?
2. What two familiar animals belong to the many-footed creatures?
3. How many legs has each one?
4. Describe the milliped.
5. Describe the centiped.
6. How does it differ from the milliped?
7. Of what does the body of the milliped consist? The centiped?
8. How many legs has each part of the milliped?
9. How many has each part of the centiped?
10. How many rings in the body of each?

NOTE TO TEACHERS.—There are so many creatures in the world, and all with different disposition and habits, that the question will naturally arise in the mind of the pupil as to why God created them, since many of them are so troublesome and annoying. Here you can show that God made all things good, but sin has wrought a sad change in their natures. Read in connection an extract from "Spiritual Gifts," Vol. 3, p. 75, which indicates that many animals

exist to-day which God did not create, but which are the result of the amalgamation of the species.

Note Book Requirement

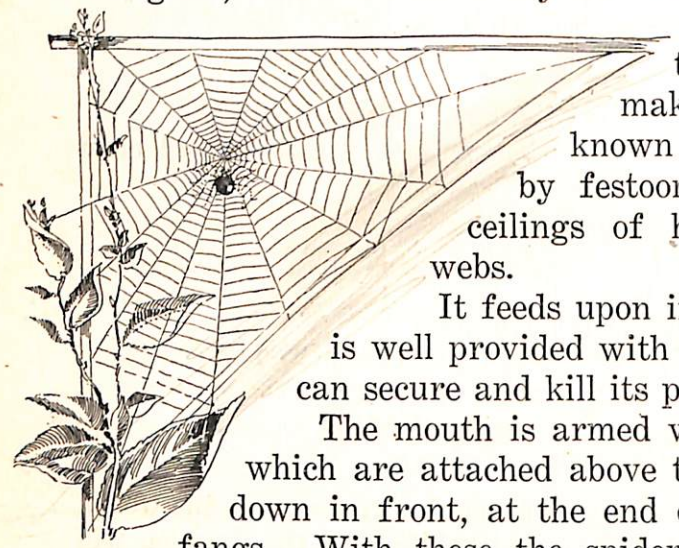
Describe briefly the centiped, page 80.

Lesson XCIII

Web Spinners

The spider taketh hold with her hands, and is in kings' palaces. Prov. 30: 28.

The common spider needs no introduction to most boys and girls; therefore the study will be of interest as it is watched from day to day. The spider makes its presence known to the housekeeper by festooning the walls and ceilings of her house with its webs.



It feeds upon insects and flies, and is well provided with weapons whereby it can secure and kill its prey.

The mouth is armed with a pair of jaws, which are attached above the mouth and hang down in front, at the end of which are poison fangs. With these the spider poisons and paralyzes its prey. Just behind these two large jaws are two smaller ones, which are used to crush the food and arrange it for the mouth. Just in front of the first pair of legs is a pair of jointed feelers, with which the spider feels its way along.

Not only can this creature run about, but it is also able to suspend its body in mid-air by making a rope just for the occasion. This rope is secured to a limb of a tree or to the ceiling, and the spider lets its body down, making the rope as it goes. If it desires to go back, it climbs up the same rope by which it came down, and gathers it up as it ascends.

If you examine closely the abdomen of the spider, near the hinder end, you will find some little tube-like machines. These *spinnerets* are covered with hollow, jointed hairs, and through these a fluid escapes which looks something like the white of an egg. The streams of fluid from the different tubes unite and form a thread composed of many strands. These threads dry rapidly when exposed to the air.

As the thread is made, the spider guides it with its hind pair of feet. These are curiously fitted, not only for holding and guiding the thread, but also for enabling the spider to run rapidly across the web without getting entangled, as is the case with the insects when they attempt to do the same thing.

The spider has not only eight legs, but also eight eyes. These are found on the front part of the thorax, instead of on the head. They look like small black beads, and can be easily seen in large spiders.

The female spider weaves a case, in which she places her eggs. The most common case is oval in shape, and may be found suspended in barns and sheds. Collect some of these cases, and break them open. If the eggs have hatched, you will find hundreds of small spiders moving about in the nest.

The spider family is exceedingly large, and includes grandfather long-legs, lice, mites, ticks, and many others which you will study sometime later. The scorpion and tarantula, which live in tropical regions, are very poisonous members of the spider family.

Questions

1. Where does the spider live?
2. What is its food?
3. How does it secure its food?
4. How does the spider suspend its body in the air?
5. Describe the spinning organs.
6. How does the spider build its web?
7. Describe the eyes and legs of a spider.
8. How are new spiders produced?
9. Name some of the near relatives.
10. What members are poisonous?
11. Where do they live?
12. To what is the hypocrite's hope and trust compared? Job 8: 13, 14. Why?
13. Is the spider a wise creature? Prov. 30: 24-28.
14. What does it use in building its web?

Note Book Requirement

On page 80 draw a spider's web.

Lesson XCIV

The Two-Wing Family

Insects belonging to this family are so common that it would seem as if we ought to know all about them, yet very few children, or even grown people, can give the life history and habits of the common house fly.

The fly has two gauzy wings, with bronze and purple tints. The wings and legs are attached to the thorax, the middle portion of the body.

By examining the fly with a small hand-lens, you will see that its body and legs are covered with small, stiff hairs. Those on the legs the fly converts into combs or brushes, and with these it cleans its body.

The fly has a short bill, or beak, which it uses in obtaining liquid food. Doubtless you all have reasons of your own for knowing that the fly has a bill. It also has feelers reaching forward from the head, and two round eyes. The microscope shows that each of these eyes is composed of thousands of little eyes, fitted closely together.

THE HOUSE FLY

The foot of the fly is so made as to enable it to walk on walls and ceilings with perfect ease. The last joint of the foot contains two claws. Under each claw there is a pad, or soft cushion, covered with hairs. From these hairs flows a sticky fluid, which causes the foot to stick to the surface upon which the fly wishes to walk. This explains why the fly can walk so easily on the ceiling. Where the surface is rough, the delicate claws are brought into use.

Has the fly ears and a nose as well as eyes?—None have been found; but some suppose that the feelers have something to do with hearing and smelling, as is the case with many insects.

The fly has no bones; but the body is surrounded with a thin, horny case, which serves as a skeleton. The skeleton of most animals is on the inside of the body, while that of insects is on the outside.

The fly has no gills nor lungs; but the air passes into the body through little holes in the horny case. These open into air sacs, which are spread out through the body.

The hen lays an egg from which a chicken is hatched; but the fly lays an egg which hatches, not into a little fly, but into a small white grub, about one third of an inch in length. Did you ever see one of these baby flies?

The mother fly lays her eggs in litter found about stables and elsewhere. The small grub eats heartily for about a week, and then changes into a shell-like case called a *chrysalis*. In two weeks this chrysalis bursts open, and a full-grown fly steps out, dries its wings, and flies away.

Questions

1. How many wings has the house fly?
2. What is their color?
3. How many parts has the body of the fly?
4. To which part are the legs and wings attached?
5. With what is the entire body as well as the legs covered?
6. What use is made of the small, stiff hairs on the legs?
7. Describe the beak of the fly.
8. For what purpose is it used?
9. Describe the head of the fly.
10. How many feelers has it? How many eyes?
11. Of what is the eye composed?
12. Describe the foot of the fly and tell how it is enabled to walk upon the ceiling.
13. Has the fly ears and nose as well as eyes?
14. Has the fly bones?
15. With what is the body covered?
16. In what way does the fly breathe?
17. In what way does the fly multiply?
18. Where does the fly lay its eggs?
19. How does the egg develop into a full-grown fly?

20. Where in the Bible do we find a record of the plague of flies?

Note Book Requirement

On pages 81 and 82, draw a member of this family, and write its life history.

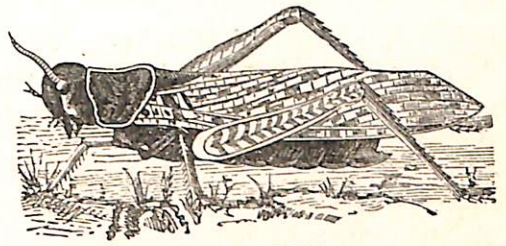
Lesson XCV

The Straight-Wing Family

The locusts have no king, yet go they forth all of them by bands. Prov. 30: 27.

The grasshopper and the locust are members of this family. Most of us are acquainted with these insects, for they are abundant everywhere.

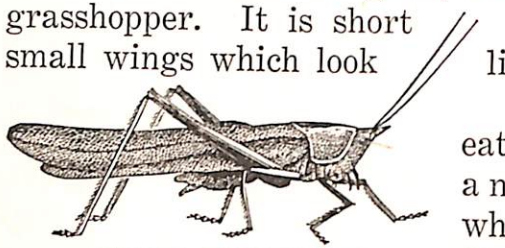
They are called straight-wings, because the front pair of wings are long and straight. These wings are thicker than those folded beneath them. The hind pair are very thin and delicate, and are folded up like a fan when the grasshopper is not flying. The thick front wings serve as a protection to the others.



THE LOCUST

The grasshopper has long and very strong legs. These strong legs enable it to jump long distances. If it desires to go farther than it can jump, it uses its wings. When the grasshopper is young, its wings are not strong enough to carry its body; but when it is full-grown, the wings are quite large. Usually it flies but a short distance before it alights.

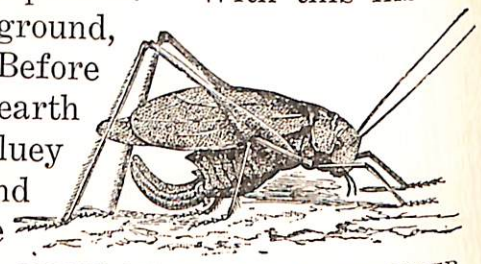
Grasshoppers differ from the insects already studied in that they do not pass through so many changes. The young grasshopper which has just come from the egg does not look like a worm or grub, but almost like the mother grasshopper. It is short and thick-set, and has small wings which look like little scales.



COMMON GRASSHOPPER

The young grasshopper eats greedily the green grass and leaves. Every little while its coat gets too small; then it splits open, and the grasshopper crawls out. Before it sheds its first coat, however, another is made underneath. Before the young grasshopper is full-grown it has had six coats. The last coat does not seem to wear out, but lasts as long as the insect lives.

The eggs of the grasshopper are buried in the ground by an instrument which it carries with it, called the *ovipositor*, meaning the "egg depositor." With this instrument a hole is dug in the ground, and the eggs placed in it. Before the eggs are covered with earth they are covered with a gluey substance, which hardens, and preserves them during the winter.



OBLONG LEAF-WINGED GRASSHOPPER

The cricket and katydid belong to the straight-wing family.

The mother straight-wing lays the eggs, while the father furnishes the music. The music is made by drawing one wing across the other, or by rubbing the wings

with the legs, much as the violinist draws the bow across the violin strings.

Questions

1. To what family does the grasshopper belong?
2. Describe the wings of the grasshopper.
3. In what way do the two pairs of wings differ?
4. Describe the legs of the grasshopper.
5. Which does the grasshopper use the most, its legs or its wings?
6. How does the grasshopper differ from the insects already studied?
7. Describe the young grasshopper.
8. As it grows in size, what change takes place in its outer coat?
9. What is the instrument called which it uses in boring a hole in the ground?
10. With what are the eggs covered before they are buried in the earth? Why?
11. Name other members of the straight-wing family.
12. How does the male grasshopper spend his time while the female is depositing her eggs?
13. How is this music produced?
14. What instrument produces music in a similar way?
15. Who does the Lord say are in His sight as grasshoppers? Isa. 40:22.
16. In what way are they like grasshoppers?

Note Book Requirement

On page 83 compare the grasshopper and the cricket.

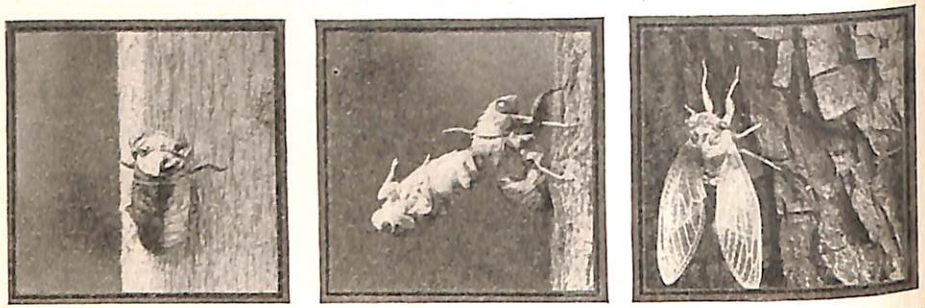
Lesson XCVI

The Half-Wing Family

The harvest fly, or cicada, belongs to the half-wing family, which is so named because half of the front pair of

wings is thickened like the sheath-wings of a beetle, while the remaining half is very thin and wing-like in structure.

The harvest fly is a good type of this family. These flies are sometimes called locusts, but this is not their right



THREE STAGES IN THE SEVENTEEN-YEAR LOCUST'S CHANGE FROM A BABY TO A FULL-GROWN INSECT

name. They develop slowly. One species—the "seventeen-year locust"—requires seventeen years, and another requires thirteen years, to develop.

The female deposits her eggs in the stems of various plants by means of a sharp-pointed instrument with which she is provided.

When the eggs hatch, the young insects drop to the ground, and burrow quite deeply, attaching themselves to the roots of plants. They live on the sap which they suck from the roots.

When they are full-grown, they come to the surface of the ground, creep up the stems of plants, shed their skins, and appear as winged insects, ready to deposit eggs for the next generation. These empty skins, or cases, may often be found where the insect has left them.

The squash bug is another member of the half-wing family, found in the kitchen and garden. Adults, young,

and eggs may all be collected from squash, cucumber, or pumpkin vines. They are blackish-brown above and dirty yellow beneath. Find the long tube between the legs with which it sucks the juice from the plants.

Those who have had much experience in picking berries are acquainted with the stink bug, so called because of its unpleasant odor. This bug often falls into the pail with the berries.

The electric-light bug, or giant water bug, as it is sometimes called, has become well known since the advent of the electric light.

Both in the spring and in the fall, these insects, after dark, leave the water, to fly about in search of new waters in which to deposit their eggs. At this time they are attracted by the electric lights, and large numbers fly about these lights until they become injured or dazed and fall to the ground.

Chinch bugs, so destructive to growing grain, are also well-known members of the half-wing family.

Questions

1. Name insects belonging to the half-wing family.
2. Which pair of wings is called half-wings?
3. What name is sometimes given to the harvest fly?
4. How many years are required to develop from the egg to the adult?
5. Where are the eggs deposited?
6. How are they placed within the stems?
7. What becomes of the larvæ after hatching?
8. Upon what do they live?
9. When the larvæ are full-grown, what do they do?
10. Why does the giant water bug bear the name of electric-light bug?

Note Book Requirement

On page 83 make drawings of members of this family.

Lesson XCVII

The Nerve-Wing Family

The nerve-wing family are so called because they all have nerve-like threads, or veins, running through their wings, which make them very strong.

THE DRAGON FLY

The dragon fly is a well-known member of this family. In some places it is called the "snake-feeder," and in others the "mosquito hawk." The latter name is more appropriate, for a large portion of its food consists of mosquitoes.

The mosquito hawk has four large rainbow-tinted wings, so that it is quite a beautiful creature. In its early life, however, it is an ugly looking insect, living in the water of some slimy, filthy ditch.

The female mosquito hawk pushes the end of her body down into the water, and glues a bunch of little yellow eggs to the stem or root of some water plant.

LARVA OF DRAGON FLY WITH MASK

In a few weeks these yellow eggs have changed into water nymphs. They grow rapidly, for they eat all the little fish and young tadpoles that come in their way. Like the young grasshopper, they shed their coat many times.

At last some small wings are seen; then they change into the chrysalis, or resting stage. In a few days they crawl out of the water on some reed or stem, and the chrysalis bursts open. In a short time the wings are strong, the legs are freed, and the beautiful insect sails away to live a happy life in the air and sunshine.

The lace-winged butterfly is another beautiful member of the nerve-winged family, but because its body emits an unpleasant odor, it is not a favorite.

DRAGON FLY HANGING FROM PUPA CASE

The dragon fly is sometimes called the devil's darning needle. This name sounds rather savage, and does not represent the true character of the insect. It is perfectly harmless, and can be taken in the hands without danger.

The best way to study the dragon fly and similar insects is to place them under a glass dish, and watch them carefully from the outside.

The dragon fly does not walk about as insects usually

do, but flits about, lighting from time to time on sticks or stones. It is usually found flying up and down streams, where it is seeking a place to deposit eggs, and also searching for food.

Questions

1. What is the name of the family of which the dragon fly is a type?
2. Why is it so called?
3. What are some of the common names by which the dragon fly is known?
4. Which one do you think is the most appropriate?
5. How many wings has the dragon fly?
6. What is their color?
7. Where is the earlier life of this insect spent?
8. How are the young dragon flies produced?
9. Where are the eggs deposited? What is their shape and color?
10. What are the young dragon flies called? Upon what do they live?
11. What changes take place while they are growing rapidly in the water?
12. How often do they shed their coat?
13. What insect have we already studied that sheds its coat?
14. What change takes place in the nymphs after a few days?
15. How does the dragon fly make its exit from the water?
16. What other insect has nerve-wings like the dragon fly?

Note Book Requirement

Write a story on what you have learned about the drawings on page 84.

end of that

Good

Lesson XCVIII

The Sheath-Wing Family

The members of this family have two thick, heavy, sheath wings, which serve as a protection to the thin, delicate wings folded beneath them.

POTATO BUG

The Colorado beetle, or potato bug, as it is often called, is a good type of the sheath-wing family.

Many persons make no distinction between a beetle and a bug. There is quite a difference, however, as you will notice in a close study of each.

The true bugs belong to the half-wing family, which has already been described. You will remember that the stink bug and the electric-light bug were mentioned as common types. These have a long sucking tube, which is folded under the breast when not in use. They use the tube for sucking the juice out of plants.

Beetles have two or three sets of strong, horny jaws, which they use in cutting and biting the roots, stems, and leaves of plants. Most of the beetles are vegetarians; but a few live on animal food, which usually consists of smaller insects.

The wing covers of the beetle meet in a straight line down the back, instead of overlapping each other, as they do in the bug.

When the beetle wishes to fly, it lifts its wing covers, spreads its wings, and flies away with a buzzing noise, which is neither musical nor agreeable. Its favorite time for flying is at evening twilight.

We will have time to study briefly one of these sheath-

wing creatures, and will begin with the Colorado beetle which is familiar to every boy and girl who lives in the country east of the Rocky Mountains. It is very injurious to the potato vine, but may be destroyed by sprinkling the vines with Paris green water. Some farmers prefer to collect the bugs and destroy them afterward.

The full-grown potato beetle lays its eggs on the under side of a leaf, sometimes as many as fifty or sixty, all standing on end, and crowded closely together.

After a few days the eggs hatch into a sort of reddish, worm-like larva. It is at this stage that the insect does so much damage. It eats greedily, and in a few days it increases to many times its larva size.

When the larva is full-grown, it goes down into the ground. In about two weeks it comes forth a full-grown beetle.

In some places three generations are produced in one season; the larvæ of the third generation go into the ground, and do not come out until the next spring. Then they deposit their eggs for the first family of the new year's potato bugs.

Questions

1. Of what family is the potato bug a member?
2. What is the meaning of the family name?
3. Describe the sheath-wings of the potato bug.
4. What purpose do they serve?
5. What is the difference between a beetle and a bug?
6. Describe the jaws of the beetle.
7. For what purpose are they used?
8. Upon what kind of diet do most of the beetles live?
9. What movements does the beetle go through before it is able to raise itself in the air?

10. What causes the buzzing noise when beetles and other insects are flying?
11. When is the favorable time for beetles to fly?
12. Where does the full-grown potato bug lay its eggs?
13. How many does it put upon a single leaf?
14. What is the appearance of the young larva?
15. Upon what does the larva feed?
16. During what period of the potato bug's life is it the most destructive?
17. What means do farmers use for destroying potato bugs?
18. When the larva is fully grown, where does it go?
19. How long does it remain in the ground?
20. What change takes place?
21. How many generations may be produced in a season?
22. How do potato bugs live through the winter?
23. Do the full-grown potato bugs, or the larvæ, appear first in the spring?

Note Book Requirement

On page 85 write in complete sentences the answers to the above questions.

Lesson XCIX

The Scaly-Wing Family

He buildeth his house as a moth. Job 27:18.

All are acquainted with the great family of butterflies and moths, for they are found everywhere in large numbers.

The moths and butterflies, when in the larva state, are usually called worms; but this is a wrong name for them, as you have already learned.

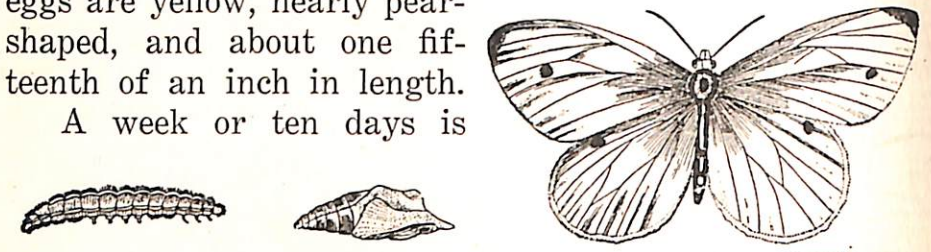
The cabbage butterfly is perhaps the most familiar member of the scaly-wing family. The family is so named because of the dust-like particles with which their wings are

covered. These particles, under the microscope, look like little scales.

The cabbage butterfly is rather small, and white in color. About the last of May or the first of June it may be seen fluttering over cabbage, radish, and turnip beds, seeking for a place to deposit its eggs.

The eggs are fastened to the under side of leaves, but seldom more than three or four are placed on one leaf. The eggs are yellow, nearly pear-shaped, and about one fifteenth of an inch in length.

A week or ten days is needed for the eggs to hatch, and the caterpillars become full-grown when about three weeks old. They then measure about one inch and a half in length.



LARVA PUPA FULL-GROWN BUTTERFLY

On account of being the same color as the leaves of the cabbage, they are not readily found.

They do not eat the edge of the leaf, but begin anywhere on the under side, and eat irregular holes through the leaf.

When they have completed their growth as caterpillars, they leave the plants, and retire to a stone wall or some old building, and there pass into the pupa state.

This is done by spinning a little tuft of silk, in which they tangle the hooks of their hindmost feet. Then they form a loop to sustain the forepart of the body in a horizontal or upright position. Bending its head on one side, the caterpillar fastens to the surface, beneath the middle

of its body, a silken thread, which it carries across its back and secures on the other side. This is repeated until the united threads have formed a strong band or loop.

On the following day it casts off the caterpillar skin, and becomes a chrysalis. This is sometimes a pale green, and sometimes a white color, regularly and finely dotted with black.

The chrysalis stage lasts eleven days, at the end of which time the insect comes forth a butterfly.

If you wish to secure the chrysalis of the butterfly, you can easily do so by placing boards horizontally an inch or two above the surface of the soil. Here it will be easy to find and collect them, either in the caterpillar or the chrysalis state.

Another very common butterfly is the large yellow insect, which has the honor of naming the family, because of its color resembling that of butter.

Moths may be distinguished from butterflies by the position of their wings. Butterflies keep their wings erect, while the moth's wings are spread out flat. Moths are more destructive than butterflies. Collect the larvæ of butterflies, and watch them spin their cocoons. The larva commonly called the tomato worm is very interesting to observe.

Questions

1. What insect is a very common member of the scaly-wing family?
2. Describe its size and color.
3. Where may it be seen about the last of May or the first of June?
4. For what is it seeking? Where are the eggs fastened?
5. How many are deposited on a single leaf?
6. How much time does it take for the eggs to hatch?
7. How large is the full-grown caterpillar?

8. Where do the caterpillars go after they have completed their growth?
9. Describe the process they pass through in building the chrysalis.
10. Describe the chrysalis.
11. How long do they continue in the chrysalis state?
12. How may the caterpillar and the chrysalis be secured?
13. Give the origin of the name "butterfly."
14. How may moths be distinguished from butterflies?
15. Which are the more destructive?

Note Book Requirement

Write the life history of a member of this family on page 86.

Lesson C

The Membranous-Wing Family

Eat thou honey, because it is good; and the honeycomb, which is sweet to thy taste: so shall the knowledge of wisdom be unto thy soul. Prov. 24:13, 14.

The honeybee is the most interesting member of the membranous-wing family, so called on account of their delicate, membrane-like wings.

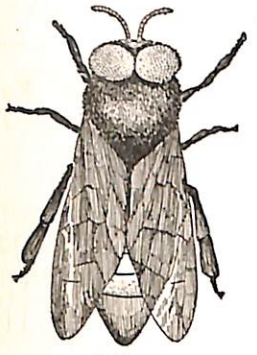
Bees are divided into three classes,— queens, drones, and workers.

They make comb, composed of many six-sided cells. In these cells the queen deposits her eggs.

It seems strange that some of these eggs should develop into queens, some into drones, and still others into workers; but each class of bees has a differently built cell, and is fed on a different kind of food. The drones feed upon food consisting of a mixture of pollen, honey, and water, while the queens are given a food called "royal jelly." Were all the queens to die, the bees would feed this "royal

jelly" to the young larva of the workers, not more than three days old, and it would develop into a queen.

When the bee family becomes very large, part of them leave and found a new home. This division is caused by the jealous feelings which the queen has when she hears the piping sound of the young queen about to hatch and come out of her cell. The old queen would destroy her daughter, but the workers will not allow her to do so, so she leaves the hive, and many of the workers go with her. This dividing of the household is called swarming.



DRONE

QUEEN

WORKER

The workers collect nectar and pollen from flowers. The pollen is gathered into little pollen sacs, one on each hind leg. The nectar is sucked through a tube into the stomach, where part of it is made into wax and the remainder into honey. The honey is stored for future use in strong, six-sided cells.

The wax is an oily substance, and becomes waxy in appearance when it comes to the surface of the body. The wax is removed from the body by the legs, then it is chewed to render it suitable for making comb.

The material which the bees use for food is called bee-bread. This is a mixture of pollen dust and nectar.

The honeybee gathers more of the nectar than it needs, and makes it over into clear, sweet honey, which we use on the table.

Bees are valuable to the farmer because they carry the pollen dust around from flower to flower, thus helping the flowers to bear seed. Were it not for the bumblebee, we would have no clover, because there would be no seed.

The bumblebee has a long tube, or tongue, which enables it to obtain the nectar from the long, slender flower tubes; and while doing this, the pollen is carried from flower to flower, and deposited on the pistils, thus fertilizing the seed.

Much might be said about other members of this interesting family, but we shall have to stop without saying anything about the habits of the bumblebee, hornet, wasp, and yellow jacket. All of them gather nectar from flowers, but they are not so industrious as the honeybee, so they gather only enough to satisfy their present needs.

Questions

1. To what family of insects does the honeybee belong?
2. Why is the family so named?
3. Name the classes into which bees are divided.
4. Describe the comb of the honeybee.
5. Where does the queen deposit her eggs?
6. How do the eggs of the queen develop into the three different classes of bees?
7. What food is fed to the drones? To the queen?
8. Is there any difference in the cells of the queen, the drone, and the worker?
9. If all the queens were to die, how would a new queen be developed?
10. What takes place among the bees when the family becomes too large?

11. What is this separation called?
12. What causes the bees to swarm?
13. How is the nectar taken from the flowers by the bees?
14. How do they gather pollen?
15. How do the bees make wax?
16. How do they make comb?
17. What is the food of the young bees called, and of what is it composed?
18. In what way are bees valuable to the farmer?
19. Name other members of the membranous-wing family.
20. How do they compare with the honeybee in industry?

Note Book Requirement

On page 87 describe a beehive and the members of the household, explaining the special work of each.

Lesson CI

The Pocket Animals

Have animals pockets?—A few of them have, and I am going to tell you about two of them. One lives in the southern part of the United States, and the other in Australia.

Can you guess their names? The one in Australia is called the kangaroo, and the one in the Southern States is the opossum. The colored people are very fond of the opossum, and it is often found on their tables as an article of diet.

The pocket is a pouch on the under side of the body. What is the purpose of this pocket?—When the kangaroo and the opossum are born, they are very imperfect and small in size. They are put into the pocket of the mother, and are nourished until they are large enough to take care of themselves.

A certain young kangaroo was measured when twelve hours old, and found to be only a little over one inch in length, while a full-grown kangaroo measures from six to nine feet in length.

So as soon as the kangaroo is born, the mother takes it in her fore paws, opens her pouch, and deposits it within. When the young are large enough, they leave the pouch, returning at will.

THE KANGAROO

Some opossums have no pouch, and the young remain firmly attached to the nipples at first, but afterward are carried on the back of the parent. It may puzzle one to know how the little fellows retain their places when the mother is moving so actively among the branches of the trees. But they guard against the danger of falling by twining their long, slender tails about that of their mother.

The kangaroo has strong hind legs and a large, strong tail, which enables it to make great leaps, somewhat like a rabbit.

The opossum goes out at twilight or during the night. During the day it lies hidden among the bushes, in a hollow tree, or on the branches. It feeds upon small creatures, birds, eggs, insects, shell animals, and even fruit and vegetable shoots, from which it sucks the sap. It is especially

fond of turkey, and often visits the farmer's poultry yard. If surprised by the farmer, it lies down and pretends to be dead.

Questions

1. Name the two most common members of the pocket family.
2. Describe the pockets of these animals.
3. Where is the home of the kangaroo?
4. Describe the young kangaroo.
5. How are they cared for?
6. What is the size of the young kangaroo? Of the full-grown kangaroo?
7. How does the kangaroo travel about?
8. How does it protect itself from danger?
9. Describe the opossum.
10. Describe the nourishing of the young.
11. How do the young travel about?
12. Upon what does the opossum live?
13. How does the opossum behave when disturbed by its enemies? Why?

Note Book Requirement

On page 88 describe briefly the opossum.

Lesson CII

The Toothless Animals

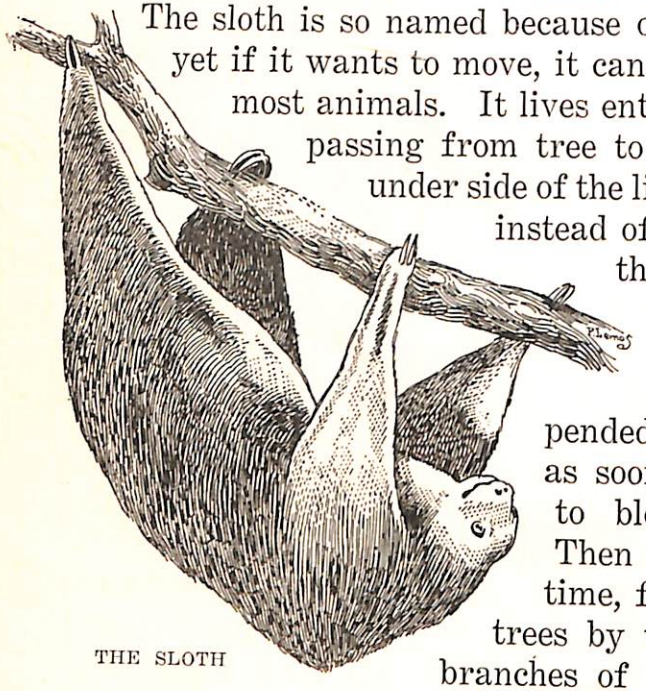
He also that is slothful in his work is brother to him that is a great waster. Prov. 18: 9.

The toothless animals are curious creatures, and are thought to have but little sense. They received the name "toothless animals" because some of them have no teeth at all, while in others the teeth are absent from the front of the jaw.

These creatures are unknown to most of us, because

they live in foreign lands. They are interesting objects, however; therefore we must have a short study about them, even if we may not have the privilege of seeing them.

Three of the most interesting members of the toothless family are the sloth, the ant-eater, and the armadillo.



THE SLOTH

The sloth is so named because of its lazy habits; and yet if it wants to move, it can get about as lively as most animals. It lives entirely among the trees, passing from tree to tree, hanging on the under side of the limbs with its four legs, instead of scampering about on the top of the limb, as do squirrels and monkeys. When the day is calm, it sleeps suspended from a limb; but just as soon as the wind begins to blow it moves about. Then is its most favorable time, for the swaying of the trees by the breeze causes the branches of the different trees to come closer together, enabling the sloth to pass from limb to limb without dropping to the ground.

The feet of the sloth are so made that it can not walk on the ground, for it has no soles, but instead, has two or three long claws which are very useful in climbing. If the sloth be placed on quite rough ground, it drags its body very clumsily. It is no more at home on the ground than a hen would be in the water.

The sloth is wholly a vegetarian, living on leaves and fruit. Its home is, for the most part, in the tropical regions, ranging from the southern portions of Mexico to Rio de Janeiro, in South America. The sloth tribe number but few, and live in gloomy forests, where poisonous snakes take up their abode, and where dismal swamps, with thorny bushes and shrubs, obstruct the steps of civilized man.

The armadillo is found in South America, but differs much in appearance and habits from the sloth. It is a burrowing animal, and for this purpose is provided with strong claws for digging. The upper surface of the body is covered with a heavy coat of mail, which is formed of hard, bony plates united at the edges. This peculiar covering causes the animal to look something like a rat running away with a turtle shell. Its food consists partly of animal and partly of vegetable substances, and fruits. The giant armadillo is over three feet in length, but the other representatives are quite small.

The ant-eater, as the name signifies, is a lover of ants. Most of the ant-eaters have no teeth; if any are present, they consist of a few molars; but they have long, cylindrical tongues covered with sticky saliva, which furnishes the means for entrapping the prey. The body is covered with hair, and some of the ant-eaters have long, bushy tails. Their bodies are sometimes three or four feet long. Some of them, when threatened with danger, will roll themselves up like a hedgehog.

Questions

1. Are the toothless animals well known?

2. Why are they called toothless animals?
3. What three members of this family are the most common?
4. Where do they live?
5. Describe the sloth.
6. What does it eat?
7. When is it most active?
8. Describe the home of the sloth.
9. Describe the armadillo.
10. How does it differ from the sloth?
11. What does it carry on its back?
12. What does it resemble?
13. What does it eat?
14. Describe the ant-eater.
15. Describe its tongue and teeth.
16. Of what does its food consist?
17. How does the ant-eater behave when threatened with danger?

Note Book Requirement

On page 88 describe briefly the ant-eater.

Lesson CIII

The Gnawing Animals

In this lesson we shall study a member of the gnawing family, called the gray squirrel. It is a handsome animal, and full of life, as are all the squirrels.

Its jaws are armed with strong teeth, and the four front ones are very sharp. There are two of these in each jaw, and they are shaped like the edge of a chisel. The more these chisel-shaped teeth are used, the sharper they become. They seem never to wear out, but are constantly renewed from the roots.

Squirrels are very fond of nuts, and carry these nut-crackers with them wherever they go.

The gray squirrel has whisker-like hairs growing on each side of its face. Its nose is rather blunt. Its cheeks, nose, and ears are of a yellowish-brown color.

Along the sides of the body is a strip of yellowish-brown. There is a dull strip of brown extending from the top of the head to the tail. The rest of the body is of a light gray color.

THE GRAY SQUIRREL NIBBLING A NUT

It has a long, bushy tail, of which it seems to be very proud. This tail is of great service to the squirrel when jumping from the high trees to the ground, for being extended horizontally, it is of the same help to the squirrel that a wing is to a bird. When at rest, or running about from limb to limb, the tail is usually carried in a vertical position.

There are many varieties of the squirrel, some of the common ones being the red squirrel, black squirrel, ground squirrel, and flying squirrel.

Squirrels live chiefly on hazelnuts, beechnuts, almonds, acorns, chestnuts, and fruit. Thus we see that the squirrel is a vegetarian when allowed to have a choice in the

matter of diet. If deprived of nuts and fruit, the squirrel will attack birds' nests, and suck the eggs or devour the young. In northern countries it eats the seeds of the pine and fir trees. Squirrels are also very fond of grains, such as wheat, corn, etc.

Squirrels manifest forethought in the matter of storing up provision in summer, hence they do not suffer from hunger in the winter. They not only provide food in one place, but conceal it in many places, that they may not be left destitute should they be robbed of their principal storehouse. They hide away their food in the trunks of trees, and sometimes in the ground. The squirrel has an excellent memory, so that it never fails to find the places where its food has been stored away.

The nests of squirrels are usually places in a crevice between two branches of a tree, or in a hole in the trunk. Their homes are made of bits of dry wood interwoven with moss. They are nearly round in form, and large enough to contain the father and mother with three or four children. At the top of the nest is an opening just large enough to allow entrance. In order to keep the rain out of the nest, the squirrel places above the opening a slanting shelf, which carries off the water, and keeps the home from becoming water-soaked.

The habits of all squirrels are very much the same, but they differ much in the matter of size and color. The great fox squirrel of North America is probably the giant among squirrels.

Questions

1. Name several members of the gnawing family.
2. Describe the teeth of the gray squirrel.
3. Describe its head.

4. Describe the squirrel's tail.
5. Of what does the squirrel's diet consist?
6. When only will it eat flesh food?
7. In what way does the squirrel manifest forethought?
8. What creature previously studied stores up food for the winter?
9. Where does the squirrel store up its food?
10. In what way does it protect itself from intruders?
11. Where do squirrels build their nests?
12. What material do they use?
13. How large a family does it contain?
14. How do they keep out the rain?
15. In what respects do squirrels differ?
16. What is the name of the giant squirrel?

Note Book Requirement

On page 89 write a story about your own pet squirrel, or tell some story about a squirrel of which you have read.

Lesson CIV

The Flesh-Eating Animals

The young lions roar after their prey, and seek their meat from God. Ps. 104: 21.

The cat is a very common domestic animal, and it would seem as if we ought to know all about it, since we see it in and about our homes every day.

The cat is a very common type of a large family of animals called the flesh-eaters. If you examine the cat closely, you will see that its feet are cushioned so that it can move about very noiselessly, and steal upon its prey unawares. Its teeth are adapted to flesh-eating. There are four long, sharp teeth, two on each jaw, which are used in tearing flesh. The cat very much resembles its wild

relatives, the tiger and the leopard. Both of these animals have very strong bodies, and are able to leap great distances.

We have not only tame cats, but wild cats are found in different parts of the world. The wild cat is a reddish-brown animal, having more or less distinct black stripes on its body. It is about two feet long. It climbs trees very swiftly, and from some limb it quickly pounces down on its prey. It feeds upon birds, squirrels, hares, and rabbits.

LION CUBS. TAKEN AT THE AGE OF THREE MONTHS

Some believe that the domestic cat descended from the wild cat; that is to say, that all cats were wild at one time, but that a great many of them have been tamed. This can hardly be true, for at the present time it is impossible to tame the wild cat so that it will be gentle and docile.

It is in harmony with the Bible to think that the cat and all other animals were tame in the beginning, and that many of them, on account of sin and illtreatment by man, have escaped from his dominion, and now it is impossible for him to control them as Adam did in the beginning.

Another member of the flesh-eating family, which is

found in the domestic state, is the dog. The teeth of the dog are very much like those of the cat, but the dog is very different in disposition. The cat is a cowardly and dishonest creature, and is untrustworthy. Compare the eyes of a cat and a dog. The cat has a suspicious look, while the dog has a frank and confiding expression. The cat has no desire to be of use to its master, while the dog is ever willing to go at his bidding. The dog constantly seeks the good will of its master, and quickly forgets any mistreatment that it may receive.

DOG AND MASTER

If you speak unkindly to a dog, it feels pained and grieved; you can see this in its eyes and in its actions. Now speak pleasantly to it; its eyes sparkle, and it jumps about and wags its tail to express its delight at having once more the good will of its master.

The cat is not entirely a useless animal, for it helps to get rid of the troublesome rats and mice about the home; but it does this simply to gratify itself, not its mistress. The lion, bear, panther, wolf, and fox are members of the flesh-eating family; but we shall have to study about these at some future time.

Questions

1. What common domestic animal belongs to the flesh-eaters?
2. What are the names of near wild relatives?

3. Where does the wild cat live?
4. Describe it.
5. What do you know about the origin of the cat?
6. What enables the cat to move about so noiselessly?
7. Describe the teeth of the cat.
8. What can you say about the strength of these animals?
9. Compare the cat and the dog as regards disposition.
10. Which is the most useful?
11. Which is the most self-sacrificing?

Note Book Requirement

Compare two flesh-eating animals pictured on page 90.

Lesson CV

The Thick-Skinned Animals

Behold now behemoth, which I made with thee; he eateth grass as an ox. Job 40:15.

The whale is the largest of the animals which live in the water, but the elephant is the largest of the animals that live upon the land.

The elephant is a very strong animal, and has an imposing and noble appearance, but it is rather awkward and clumsy in its gait.

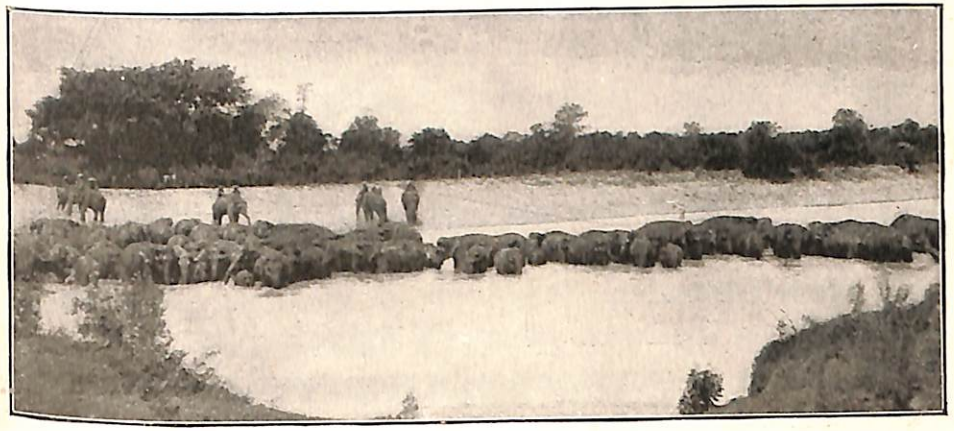
The elephant belongs to the thick-skinned family. Some of its near relatives are the rhinoceros and the hippopotamus. Sometimes the wild boar and the hog are classed in this family also.

The elephant has two large, thin ears, which may extend in all directions from the head. These it uses in fanning itself, and for scaring away flies.

Its eyes are very small for so large an animal. Its

mouth also is quite small, and is almost entirely hidden behind the tusks and the base of the trunk.

The trunk of the elephant is very peculiar in shape. It is merely the nose prolonged to a great length, and has the shape of a tube, ending in two small openings, called nostrils. In it are located the senses of smell and touch. It uses its trunk in many ways,—as a hand to convey food to the mouth, and also as a weapon with which to fight its



CORRALLING A HERD OF ELEPHANTS ON THE CONGO RIVER

enemies. With it, it can seize and pick up very small objects such as a piece of money or a straw. It uses its trunk also for lifting heavy weights and for putting them on its back; and for drinking, by filling it with water, and then letting the water pour down its throat.

The elephant has two long tusks composed of ivory, one growing on each side of the trunk.

The elephant is a vegetarian, and has no canine teeth, such as the dog and the cat possess. The diet of the elephant consists of grass and fresh leaves. It is especially fond of sugar-cane tops.

The elephant is an intelligent animal, and can be trained to do many difficult things. It is kind and docile when trained, but avenges unkindness without mercy.

When the elephant passes through a crowd of people, it opens a passage for itself with its trunk, and gently presses forward its fore limbs in such a manner as to hurt no one. The elephant is very fond of children. In India, mothers often leave their young children in the care of one of these great giants.

The rhinoceros is not so large as the elephant, and has not so long a nose. It has on its nose one or two solid horns, which are used as weapons of defense.

The hippopotamus, which means river horse, is so large and clumsy that it does not spend much time on the land, but swims about in large rivers, keeping only its eyes and nose above the water. It lives upon vegetable foods, which it finds along the banks of rivers and streams.

The Lord speaks to Job of a very large animal, called the behemoth. You will find a record of this in Job 40: 15-24.

Questions

1. What creature is the largest of the land animals?
2. Of the water animals?
3. Of the birds?
4. What is the general appearance of the elephant?
5. To what family does it belong?
6. Why is the family so named?
7. Name other members of the thick-skinned family.
8. Describe the ears and eyes of the elephant.
9. Where is the mouth located?
10. What is peculiar about the nose of the elephant?
11. What use does it make of its ears?

12. Upon what does it feed?
13. What can you say about the intelligence of the elephant?
14. Describe the rhinoceros.
15. Of what are the tusks of the elephant composed?
16. What king, spoken of in the Bible, had a throne constructed of ivory?
17. Describe the hippopotamus.
18. Where does it live?
19. Of what does its diet consist?
20. What animal do you think is described in Job 40: 15-24?

Note Book Requirement

On page 91 outline a story concerning the elephant.

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do not have answers

Lesson CVI

The Hoofed Animals

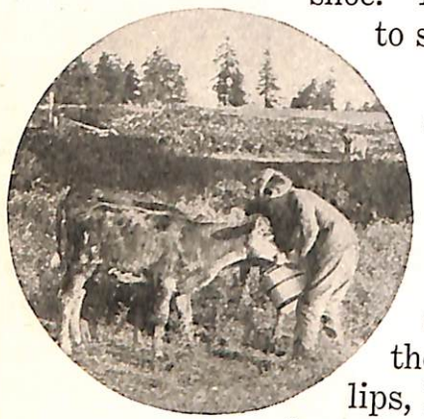
Hast thou given the horse strength? Job 39:19.

The animals we have studied so far have toes which end in claws, but now we come to the study of a family whose toes are protected by a hard, horny covering called a "hoof."

The cat and other animals which have long, sharp claws, use them in catching and holding their prey. This is never done by the hoofed animals, such as the horse, cow, and pig. The pig holds down the ear of corn with its foot while it is eating, and the horse paws away the snow to reach the grass; but the principal use made of the hoof is in walking and kicking.

The toe of the horse is covered with a hard, bony wall. When this animal is shod, the nails are driven into this

hard substance. On the flat bottom of the foot, within the wall, is the frog, shaped like the letter V. Between the frog and the wall is the sole of the foot. It is just inside the shoe. The wall, frog, and shoe are used to support the body of the horse.



BREAKFAST TIME IN THE PASTURE

The horse has many cousins, some of them wild and some domesticated. They include the mule, ass, burro, and zebra. These are unlike the horse in that they have large ears and a rasping voice. They resemble the horse as regards teeth, hair, lips, legs, and skin. The zebras are beautifully striped animals which roam the wilds of Africa.

Burros and donkeys look as if they felt themselves extremely illtreated. They are valuable because of their great strength and power of endurance. They can carry burdens nearly equal to their own weight, and when traveling through the desert can go without drinking for two or three days.

The horse is the most useful of all the domestic animals. If properly treated, he is always willing to render prompt and obedient service, and many times will work even beyond his strength.

The horse is probably as old as man himself. In the books of Moses, the horse is often referred to in connection with war. The Lord has given us a description of the horse in the thirty-ninth chapter of Job, showing how he behaves in time of battle:

"Hast thou given the horse strength? hast thou clothed his neck with thunder?

"Canst thou make him afraid as a grasshopper? the glory of his nostrils is terrible.

"He paweth in the valley, and rejoiceth in his strength; he goeth on to meet the armed men.

"He mocketh at fear, and is not affrighted; neither turneth he back from the sword.

"The quiver rattleth against him, the glittering spear and the shield.

"He swalloweth the ground with fierceness and rage; neither believeth he that it is the sound of the trumpet.

MAN'S HELPERS

"He saith among the trumpets, Ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting."

Questions

1. Describe the horse.
2. In what respect do the feet of the horse differ from those of the animals previously studied?
3. For what purpose does the cat use its sharp claws?
4. For what purpose do the hoofed animals use their feet?
5. When a horse is shod, into what part of the foot are the nails driven?
6. What letter of the alphabet is seen on the bottom of the horse's foot?
7. What is this usually called?
8. Name the three parts of a horse's foot.
9. Name some of the wild relatives of the horse.

10. In what respect do they differ from the horse?
11. In what respect do they resemble it?
12. Describe the zebra.
13. Where does it live?
14. Name some of the domesticated relatives of the horse.
15. Describe the burro and the donkey.
16. In what ways are they of service to man?
17. What is the disposition of the horse?
18. Can you tell anything of the character of the horse's master by studying the disposition of the horse?
19. Where is the horse first mentioned in the Scriptures?
20. For what purpose did they use the horse in ancient times? Esther 8: 10; 2 Kings 9: 18, 19; Ex. 15: 19.

Note Book Requirement

On page 92 write a brief description of the horse.

Lesson CVII

The Four-Handed Animals

We must not close the study of the land animals without noticing the interesting group called the four-handed animals. It includes the monkey, ape, gorilla, chimpanzee, and orang-outang. All these creatures live in tropical regions; indeed, it is with difficulty that they can live in temperate countries.

The principal home of the monkeys of the New World is Brazil. It is a land of perpetual summer, with dense, luxuriant forests, which abound with fruit, the favorite diet of the monkey.

The reason why this group is called four-handed animals is because they are able to use the four feet as hands.

Not only so, but their feet are formed like a man's hand, having four fingers and a thumb.

The spider monkey is sometimes said to have five hands, for it can use its tail as a hand to grasp a branch or another monkey's hand. It is called the "spider monkey" because it looks like a spider going over its web, when, with hands, feet, and tail it glides swiftly over the network of branches. These monkeys sometimes make a "monkey-rope," reaching from a limb of a tree to the ground, by hanging by their tails, one beneath another.

CARING FOR THE SICK

Another monkey living in South America is called the "howling monkey," for every time the sun rises and sets, this boisterous fellow begins to howl. Others take up the cry till often forty or fifty join in with it. These howlers are often caught, but it is impossible to tame them. South America contains the only monkeys which can use their tails for grasping.

The four-handed animals are interesting creatures to watch. They are very curious and playful. They perform

some wonderful feats, about one of which I must tell you. Of their own bodies monkeys can form a living bridge across chasms, gorges, and rivers, so that the mothers and children can pass over easily and quickly. This is the way it is done:

Some of them run up a large tree near the edge of the stream; then one of them passes out on a strong limb, and making several turns of its tail about the limb, slips off, and hangs with its head downward. Then a second one climbs down the body of the first, and fastens its tail about the neck and fore limbs of the first. This is repeated until a long monkey rope is formed.

This living rope starts to swing, slowly at first, but in a few minutes the monkey at the lower end catches a branch of a tree on the opposite side, and the bridge is formed. Sometimes four or five hundred monkeys will pass over this living bridge.

The question now arises: How will the monkeys forming the bridge pass over? Should number one let go its tail, it, with several others, would be dashed against the opposite bank or dropped into the water. Several of the strongest monkeys throw their tails about the last monkey in the bridge, and run up to a strong limb that is higher, thus lifting the bridge into an almost horizontal position. This being done, a screaming signal is given by the last monkey to the first one forming the bridge, to let go of the limb, then the whole chain swings over. The lowermost animals drop to the ground, while the higher ones leap to the branches, where they can afterward come down by the trunk.

Questions

1. Name members of the four-handed family.
2. Where do these creatures live?
3. Why are they called four-handed?
4. Compare their hands and feet with those of man.
5. What organ of the body is used for climbing, besides the hands and feet?
6. Describe the "spider monkey."
7. How do these monkeys reach the ground from the end of a long limb?
8. Describe the "howling monkey."
9. Can the monkey be tamed?
10. What is the general disposition of these creatures?
11. How do monkeys cross chasms, gorges, and rivers?
12. How do the children pass over?
13. Describe the monkey bridge.
14. How many families of animals have we studied so far?
15. What types have been studied under each family?
16. Make a table showing the families studied, and the types under each family.

Lesson CVIII

God's Control of the Land Animals

Every beast of the forest is Mine, and the cattle upon a thousand hills. I know all the fowls of the mountains: and the wild beasts of the field are with Me. Ps. 50: 10, 11, R. V., margin.

Since God created them, of course He is acquainted with every land animal. Not only do the beasts of the field *belong* to God, but they are *with* Him. They live by the life that He constantly gives.

To prove that God has the control of the creatures which

live on the land, think of the following stories, with which you are perhaps familiar already:

1. Balaam's ass. Num. 22: 22-33.
2. The ark drawn by two cows. 1 Sam. 6: 1-14.
3. Daniel in the lions' den. Dan. 6: 16-24.
4. Jesus rode on the young colt. Matt. 21: 1-8.
5. The plague of lice. Ex. 8: 16-19.
6. The plague of flies. Verses 20-24.
7. The plague of locusts. Ex. 10: 12-20.
8. The insect which destroyed Jonah's gourd. Jonah 4: 6-8.

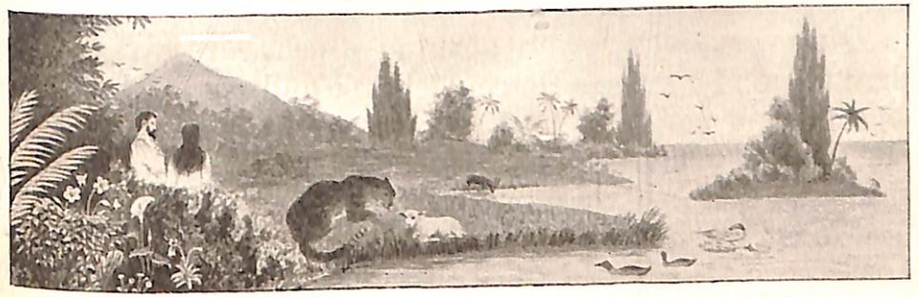
Although we have learned a little of the trouble that destructive insects bring, we have a promise that for the sake of His children God will rebuke their work. This promise is given on a certain condition.—What is it? Mal. 3: 10, 11.

CONTENTMENT

CHAPTER XI

MAN

(Scripture Basis, Gen. 1:26-28)



"So God created man, . . . male and female created He them."

Lesson CIX

The Creation of Man

And the Lord God formed man of the dust of the ground. Gen. 2:7.

After God had brought into existence the fishes of the sea, the fowls of the air, and the creatures which were to live on the dry land, He said: "Let Us make man in Our image, after Our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth." Gen. 1: 26.

"So God created man in His own image, in the image of God created He him; male and female created He them." Verse 27.

Man was the climax of God's created work on the earth. He was made a little lower than the angels, and was crowned with glory and honor.

The name of the father of the human family was Adam, and the name of the mother was Eve.

The holy pair were placed in Eden, and were surrounded with everything lovely. God placed them in the garden, not to spend their time in an idle way, but to dress the garden and to keep it.

Man was given powers of mind which were far greater than those of beasts. He could think and study about the wisdom and power of God as revealed in His handiwork. He was holy and righteous in character; for man was made upright in the beginning.

He was wonderfully made. David, in speaking of the human body, said, "I will praise Thee; for I am fearfully and wonderfully made."

Like the plants, man was formed from the dust of the ground; but the all-wise Creator endowed him with a body and a mind unlike anything that He had before created upon the earth.

Questions

1. Out of what did the Lord build this world?
2. What was its condition when first created?
3. What was God's purpose in creating the earth?
4. What was present to help in the work of creating and forming the earth?
5. What was the first work which the Lord did to bring order out of chaos?
6. What did the light and heat do?
7. What was created the second day?
8. For what purpose did God create the air?
9. What was perfected by the first two days' work?

10. What was the first thing done on the third day?
11. For what purpose was the dry land caused to appear?
12. How many classes of plants did the Lord create?
13. Will plants grow without light, heat, air, and water?
14. After the Lord had planted the earth with vegetation, what did He then do?
15. For what purpose did God make the sun and moon?
16. For what purpose did God create the plants?
17. How many classes of animals were created?
18. How many homes were provided for them?
19. Whom did God create on the sixth day, who was more perfect than any of the animals previously created?
20. Out of what did the Lord make man?
21. What relation was he to sustain to the lower animals?

Note Book Requirement

On page 93 tell in your own words the story of man's creation.

Lesson CX

Man's Relation to Light

Truly the light is sweet, and a pleasant thing it is for the eyes to behold the sun. Eccl. 11:7.

God provided five special gateways through which knowledge should enter the mind of man. There are five special means of gaining a knowledge of what is in the world around us,—by seeing, hearing, feeling, smelling, and tasting. Only thus can knowledge and truth make an impression upon the mind.

Of these special gateways, none is more wonderful than the eye, the organ of sight. He who made the light made the eye, and fitted it to receive the light.

Sight is indeed a very precious and valuable gift. By means of this gift we learn what is going on in the world around us, near by, and also many miles away. Without this gift what would all the beautiful colors of light mean to us?

The eye is so precious that it is protected in every way possible. We may think of it as a very costly gem set in a nicely made case.

In shape, the *eyeball* is not unlike an egg, and is well fastened in a special place fitted to its shape. A deep, bony *socket* was made to receive the nicely planned organ of sight. The *eyelids* shut down whenever the eye is in danger. These lids are fringed with *lashes* to keep the dust out.

The colored part of the eye, that makes it so beautiful, is the curtain of this wonderful window. The black spot in the middle of the colored curtain is the opening. It is called the *pupil.* This colored circular curtain can make the opening large or small, so that the right amount of light may be let in. The eye is small, but it can take more beautiful pictures than the finest camera, and can take all the colors, too.

When one goes out into the bright sunlight, the curtain draws together around the pupil, and less light is allowed to enter. When one enters a dark room, the curtain is drawn back to make the pupil larger and let in more light.

By good care the eye may be kept bright and useful for many years. It is good for the eyes to use them, but they must always be well treated. It is not wise to unnecessarily expose the eyes to too brilliant a light. When

the eyes smart or tingle, or the sight is dim or blurred, the eyes need rest.

Questions

1. Name the organ of sight.
2. Of what use is this organ?
3. What is the organ of sight fitted to do?
4. How is it protected?
5. Describe the curtain and the pupil.
6. How may the eyes be kept useful?

Note Book Requirement

On page 94 write answers to the above questions.

Lesson CXI

Man's Relation to Heat

Animals, like plants, could not exist were it not for the heat given to the earth by the sun. The beautiful spring weather, with its warm, sunny days, is a gift to us from the sun. But the Lord made the sun; therefore these days are really a gift from Him.

But whether the weather is warm or cold, the heat of the body remains constant.

If the temperature of the body is taken by placing a thermometer under the tongue, it will be found to be 98 degrees Fahrenheit, provided the person is enjoying good health. If the temperature of the body is higher than this, we know that the person has a fever. Should it fall below 98 degrees, we are warned that something is the matter with the circulation.

It is the circulation of the blood to all parts of the body that keeps up the heat of the body, and so nothing can hinder the circulation without causing trouble to the body.

Now you know that if you prick yourself deep enough anywhere the blood flows out. The only parts of the body that have no blood are the nails, the hair, and the outer layer of skin. Where does all this red fluid come from, and what keeps it flowing along in the body?

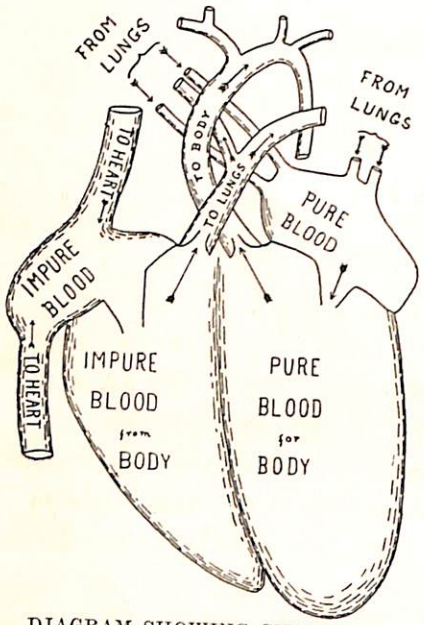


DIAGRAM SHOWING CIRCUIT OF BLOOD THROUGH THE HEART

In our study of plants we examined the leaves, and learned that through the slender veins sap was constantly circulating, carrying food to every part of the leaf.

In our bodies there are sets of tubes through which the blood is kept constantly flowing from the heart to the surface and back to the heart again.

The heart is the wonderful pump that furnishes the power to keep up this constant circuit. If for one brief moment it should cease its steady beat, beat, life would cease.

Your heart is pear-shaped, about the size of your fist. It contains four rooms, two on the right and two on the left, as you see in the picture. The rooms on the right side do not open into the rooms on the left.

You see two large tubes from which the blood empties into the rooms on the right side. You can see the large

tubes through which it is pumped out again. From here it goes to the lungs. On the left side you see four tubes entering the upper room, bringing back the blood from the lungs. Leaving the lower room on the left side, you can see the large tube through which pure blood is pumped to all parts of the body.

Note Book Requirement

Describe the passage of the blood through the heart and to all parts of the body.

Lesson CXII

Man's Relation to Air—Breathing

We have already learned that God breathed into man's nostrils the breath of life, and that from the first moment of one's life until the very last, we are constantly taking the air into our lungs and sending it out again.

Now why is breathing so necessary? We have done it all our lives without thinking about it. Of what use is the air to the body, and why may we not continue to live if shut away from it?

In our last lesson we learned that the heart pumped the blood from the lower right chamber of the heart, through two tubes, into the lungs. This is not a very long journey, for the heart lies in the chest, just between the two divisions of the lungs.

In the lungs, the blood tubes branch and divide, until they become too fine and too small to be seen by the naked eye. These small blood vessels have walls so thin that, when the air is drawn in through the breathing tubes of the lungs,

it can pass right into the blood. The tiny blood particles exchange their load of poison for a supply of fresh air, and hasten back to the heart to be pumped into the general circulation, and then carried to some remote part of the body.

In less than half a minute, however, every blood particle has deposited its supply of fresh air, and must hasten along to the lungs for more.

The tubes that lead *to* the lungs, carry blood particles that are full of poisons. Such blood is always purple in color. But the tubes that lead *from* the lungs are filled with bright red blood. These tubes are carrying multitudes of blood particles laden with fresh air, and hence the change in color.

The more we study about the body the better we shall understand how closely connected is the work of each part with every other part. If the lungs fail to do their work, of what use would be the work of the heart?

Again, if the heart should fail to do its work, how could the lungs carry on the work that God has given them to do?

Note Book Requirement

Explain the illustrations on page 97.

Lesson CXIII

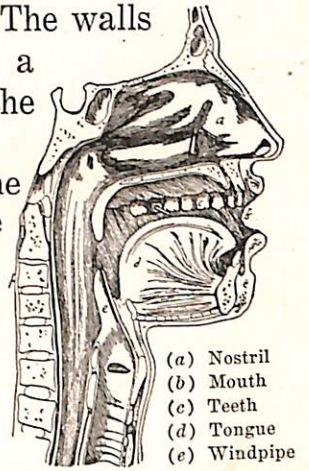
Man's Relation to Air—Smell

Besides sustaining life, the air brings to man the sweet fragrance of the flowers and the odors of his food. Especially fragrant are such fruits as apples, strawberries,

and oranges; and because we are able to detect this fragrance, we better enjoy these delicious fruits.

Smell, you remember, is one of the gateways of knowledge. It acts as a sentinel, warning us against eating improper or unwholesome foods, and against breathing impure air.

The seat of the sense of smell is in the air chambers of the nose, into which the nostrils open. The walls of these nasal cavities are lined with a thick, velvety membrane, over which the nerves of smell are spread.



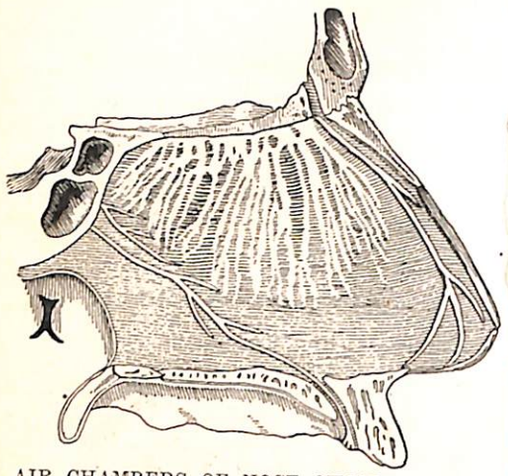
In the roof of these air chambers the sense of smell is very acute; hence we sniff the air sharply when we want to detect a faint odor. Savage races, dogs, and certain insects possess the sense of smell in a marked degree.

When we are ill with a cold in the head, we are hardly able to smell anything. This is because the nasal membrane is swollen.

After the air has passed through the nostrils and air chambers of the nose, it enters the music box. This music box occupies the top of the windpipe, and contains the organs of the voice, called the *vocal cords.*

The vocal cords are strips of membrane which can be made tight or loose by special muscles.

When one speaks or sings, it is the air passing over these tightened cords that produces the sound. So you see that if it were not for the air, we would be forever dumb; and even though God made the air, if He had not made the voice box, speech would never have been possible.



AIR CHAMBERS OF NOSE SHOWING THE NERVES OF SMELL

Questions

1. Why is the sense of smell called a gateway of knowledge?
2. What other gateway have you already studied?
3. In what way is smell a sentinel?
4. Where are the nerves of smell located?
5. Why does one who has a cold in the head usually lose all appetite for food?
6. Describe the organs of the voice.
7. Of what use is the air in producing sound?

Note Book Requirement

On page 96 answer questions, and make drawings of:
1. A fragrant flower. 2. A fragrant fruit.

Lesson CXIV

Man's Relation to Air—Hearing

Take heed therefore how ye hear. Luke 8:18.

There is another way in which the air is very useful, for hearing depends upon the air.

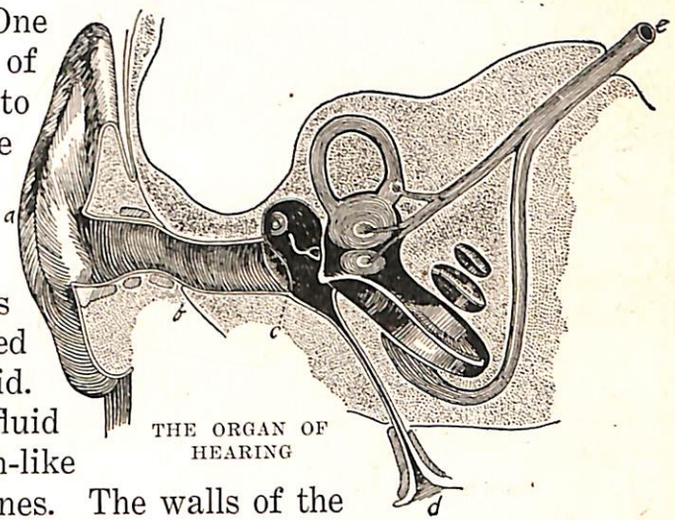
In our study of air we learned that one of its uses is the carrying of sound, and that it does this by jarring the air particles against one another.

Now the Creator, who arranged that air should carry sound in this way, knew just how to form the ear as a sound-receiver. To better appreciate this we must know something about the ear.

The ear is made up of three parts: First, the outer ear; second, the middle ear; third, the inner ear.

The outer ear (*a*) is simply a funnel leading into a canal which ends with the eardrum. The eardrum (*c*) forms a partition between the outer ear and the middle ear.

The middle ear is a cavity which contains a chain of three small bones. One end of this chain of bones is fastened to the eardrum. The other end connects with the other cavity, or inner ear.



THE ORGAN OF HEARING

The inner ear is shell-shaped, and filled with a watery fluid. Floating in this fluid are small, grain-like stones called ear stones. The walls of the inner chamber are covered with very small hairs.

And how are all these parts of use in hearing? They must all be necessary, for if any part is diseased, the organ of hearing is crippled, and this gateway of knowledge is closed.

The outer ear collects the sound waves and conducts them to the eardrum. When the eardrum is set in motion, the little chain of bones within is set in motion also. This motion is carried in through the middle ear to the fluid of the inner ear.

Here, in that curious, shell-shaped room and in the loop-shaped passages of the inner ear, the tiny, grain-like stones strike the tiny hairs with which the cavity is lined. The nerves of hearing, which the brain has sent down to

gather up the sound messages, flash to the brain the news that the air waves have brought. And thus we hear. How wonderful!

Note Book Requirement

On page 98 describe the illustrations, and tell in what way each part of the ear is of use.

Lesson CXV

Man's Relation to Water

Wash me throughly from mine iniquity, and cleanse me from my sin. Ps. 51: 2.

Water is just as necessary to the work of the body as are light, heat, and air. A person could live several days without water; but he would finally die.

While water is not a food, yet it must be taken into the body to keep us healthy and well. In fact, nearly three fourths of the weight of the body is water.

In the first place, water assists in the digestion of foods; for the food must be made into a liquid before the body can use it. Having been made into a liquid, it must be carried through the body to build up its parts. The water that helps to make up the fluid in the blood, carries this liquid food on its journey over the body.

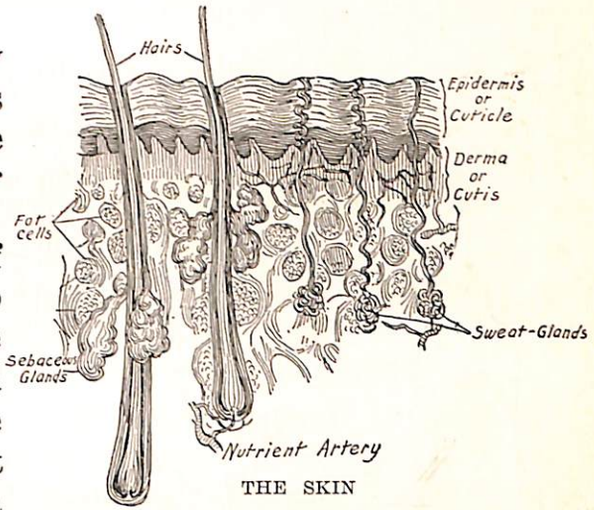
On its circuit through the body the water gathers up at every point particles of waste material. These it carries to the organs whose special work it is to rid the body of what it can not use, and which, if left in the body, would produce poisons.

To what organs is all this waste fluid taken?—Much

of it is collected by the kidneys. These are therefore very important organs. But much is thrown off at every point of the surface of the body.

In the skin are found little vessels called *pores*, through which the water reaches the surface. The water that is separated from the body through the skin is not pure, but is filled with poisons gathered while on its journey through the body.

This water is constantly escaping. When it escapes faster than the air can take it in, we call it *sweat*, or *perspiration*.



THE SKIN

Now the impure part of sweat does not go off into the air, but remains on the body. If left there, it will finally fill up the little pores, and keep the sweat from coming out. It has a very bad odor. Of course you can now see the use of a bath.

The skin is a wonderful organ. Besides this work of throwing off waste matter, it is the organ of touch and feeling. Examine the ends of your fingers and the palms of your hands. Do you notice those little ridges? Each one has in it a small nerve. These connect with larger nerves, which find their way to the brain. Thus *feeling* is another gateway to knowledge, and the entire surface of the skin is furnished with nerve endings which act like little telegraph operators constantly on duty.

There are other wonderful things to tell about the skin, but they can not be told in this lesson.

Note Book Requirement

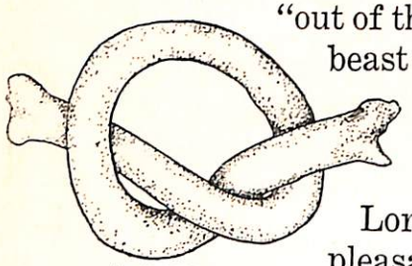
Tell in your own words why it is important to take care of the skin.

Lesson CXVI

Man's Relation to Dry Land

For He knoweth our frame; He remembereth that we are dust. Ps. 103: 14.

We learn in reading the record of man's creation that "the Lord God formed man of the dust of the ground." Not only was man formed of the dust of the earth, but "out of the ground the Lord God formed every beast of the field, and every fowl of the air." Not only were the *animals* created from the dust of the earth, but "out of the ground made the Lord God to grow *every tree* that is pleasant to the sight, and good for food." Gen. 2: 7, 19, 9.



A BONE TIED IN A KNOT

It was God's plan that the plants should, by feeding upon the soil, change it into food for man and beast. The first change is from soil to plant life; the second change is from plant life to animal life. So when we see a plant, let us remember that we are looking at soil which has been made alive, and that we ourselves are but plant life changed into a higher life.

When man dies, his body decays and turns into dust.

"Dust thou art, and unto dust shalt thou return," says the Scripture.

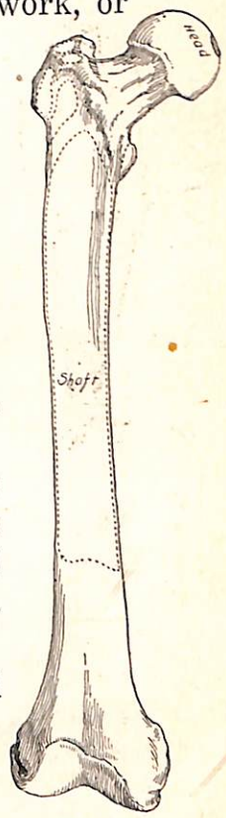
More mineral matter is found in the bones than elsewhere in the body. These bones form the framework, or skeleton, of the body, being to the body what timbers are to a house, giving it strength and form.

You have perhaps seen bleached, dry bones. These are very unlike the bones in the living body, which are a beautiful pink in color, filled with tiny blood vessels, and covered with a moist, gristle-like skin.

The animal matter in a bone may be burned away, leaving only the mineral part. The mineral part may be eaten away by acid. The gristle that is left will be soft enough to tie into a knot.

The bones of children have much more of this gristle than the bones of grown people. For this reason it is very important that during childhood the bones should be trained to take the best positions.

The *skeleton* is composed of over two hundred bones of all shapes and sizes. Some are long and round, some are thin and broad, others are short and flat; but each is exactly suited to do the work for which it was placed in the body.

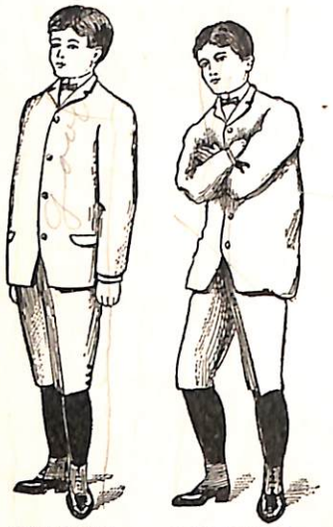


THE FEMUR

The meeting places of the bones are called *joints*. The joints allow the parts of the body to bend in different ways, so that many motions are possible.

Not only do the bones provide a support for the body, but they are also a protection to the most delicate organs. What organs have we studied that are protected by the

bones of the chest? The brain, the most important organ of the whole body, the one that controls all the others, is well protected by the bony covering, the *skull*, which surrounds it.



CORRECT INCORRECT

Perhaps you have heard the story of the gardener's attempt to straighten the old, crooked tree. It was useless, was it not? If you wish to have an erect figure, you must form correct habits while you are children. Do not slide down in your seat. Do not sit bent over your book. Stand squarely on both feet. Sit "tall" in your seats, with both feet resting upon the floor. Do not sit with one shoulder higher than the other. Do not wear tight shoes, or tight clothing about the waist. Eat plenty of good brown bread, and other foods that contain a good supply of mineral food.

Note Book Requirement

Explain the above illustrations on page 100.

Lesson CXVII

The Bone-Movers

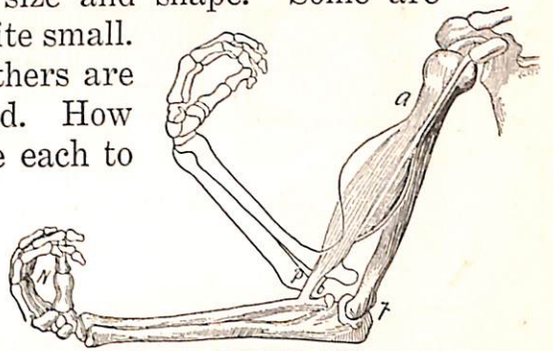
Bodily exercise profiteth little: but godliness is profitable unto all things. 1 Tim. 4: 8.

We have taken a look at the bones which make up the framework of the body. Let us now examine those portions of the body which work the bones—the bone-movers, or *muscles*.

Draw the hand to the shoulder, and you can feel the muscle of the upper arm. This muscle is fastened to the forearm, and when we wish to raise the forearm, it must shorten, and so it gets thicker in the middle. This shortening and thickening of the muscle lifts the bone of the forearm. When we straighten the arm, the muscle becomes longer again, and the bone goes back into its place.

There are nearly five hundred muscles in the body. Our arms, our legs, our fingers, toes, mouth, and eyes, and the great human pump called the heart, are all moved by muscles.

Muscles differ greatly in size and shape. Some are very large, while others are quite small. Some are shaped like a fan, others are long, some flat and some round. How much wisdom it took to make each to fit its special use!



HOW THE MUSCLES ACT

Most of the muscles are arranged in pairs, which allow movement in two directions.

The muscles are under the control of the nerves, which lead to the great nerve center, the brain; so when we wish to bend the arm, the finger, the leg, or open or shut the eye, the brain sends the message along the nerve, and the muscle acts.

It sometimes occurs that the nerves become diseased, and lose their control over the muscles. Then we say that the body is paralyzed. The muscles are perfectly helpless to move the bones, for no messages can reach them from the brain.

The arrangement of the muscles upon the bones, gives shape and plumpness to the body. Probably you have heard persons remark of one who has suffered from disease, "He is but a walking skeleton." They mean by this that the flesh, which is largely muscle, has wasted away, so that the bones stick out.

The best foods for building up the muscles are fruits and grains. Good food and plenty of exercise will develop strong muscle. The boy or girl who is too lazy to work or play, will have weak muscles, and will not be able to have the good times that other children have.

Note Book Requirement

On page 101 explain what you understand about the importance of the muscular system.

Lesson CXVIII

Man's Relation to Plants

Out of the ground made the Lord God to grow every tree . . . good for food. Gen. 2: 9.

Let us study for a while how the human body is related to the food which God has provided for man's use.

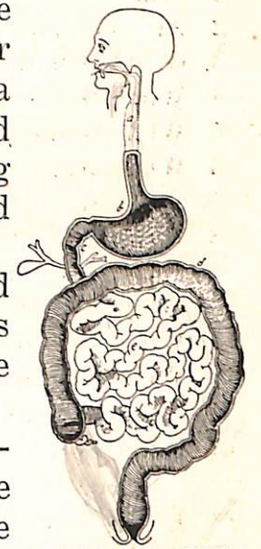
The food passes into the body through the mouth, a wonderful machine composed of lips, tongue, teeth, and palate.

The machine is a mill, in which the food is ground before it passes to other parts of the body. Some of the teeth are used in biting the food, and others in chewing and grinding it. The tongue gives us the sense of *taste*.

While the food is being ground by the teeth, there are

several streams of watery fluid, called *saliva*, flowing into the mouth. This not only moistens the food, but also partially digests it by changing the starchy portion into sugar. If you chew a dry graham cracker for some time, you will notice that the longer you chew it the sweeter it becomes. The saliva acts upon the starch, and changes it to sugar.

When the work is properly done in the mouth, the food passes down into a chamber called the *pharynx*. If it were not for a trapdoor covering the windpipe, the food would go down into this, causing coughing and choking. Many of us have experienced this when we have laughed while eating.



THE FOOD PASSAGE

After passing the *windpipe*, the food goes down into the food passage which leads to the *stomach*, the most wonderful machine of the whole body.

Here the food is churned very thoroughly by the walls of the stomach. While this process is going on, the walls of the stomach make a fluid called *gastric juice*. This juice changes certain foods into a milky fluid.

The food in the stomach is then passed through a small opening, called the "gate keeper," which guards the opening at the lower end of the stomach. Here the food is acted upon by the *bile*, which comes from the liver, and by two other juices made by the walls of the intestines.

When these three juices have acted upon the food sufficiently, it is taken into the blood, and the particles are carried throughout the whole system. Thus the entire body is nourished and built up whenever it is in need of repair.

As we study the body the Lord has given us, we see that it is wonderfully constructed. No wonder David exclaimed, "I will praise Thee; for I am fearfully and wonderfully made."

Questions

1. What food has God provided to build up the body?
2. At what place does the food enter the body?
3. Of what is the mouth composed?
4. What is the mouth sometimes called?
5. What is the purpose of the teeth?
6. What organ in the mouth is used for stirring the food?
7. What sense resides in the tongue?
8. How many senses have you studied so far? Name them.
9. What moistens the food as it is being ground in the mouth?
10. What does the saliva do to the food?
11. When the food is thoroughly chewed, what becomes of it?
12. What would be the result if food were not thoroughly chewed before passing into the stomach?
13. What keeps the food from dropping into the windpipe as it passes over it?
14. Under what conditions might the food fall into the windpipe? With what result?
15. What connects the stomach with the mouth?
16. Give the location of the stomach.
17. Can you describe its shape? What work is done in the stomach?
18. What fluid does the stomach make?
19. How does the gastric juice act upon the food?
20. Where does the food go from the stomach?
21. What acts upon the food in the small intestines?
22. Where are they made?
23. Do you think David told the truth in Ps. 139: 14?
24. Is the Lord acquainted with all the members of the body? Verses 15, 16.

Note Book Requirement

Explain the drawing found on page 102 of Note Book, and tell what part each organ represented has to do in the work of digestion.

Lesson CXIX

Health and Ill-Health

I wish above all things that thou mayest prosper and be in health. 3 John 2.

We often hear remarks like these, "I do not have very good health," or "My health is very good." What is meant by the term *health?* And upon what does health depend?

We have found in our study of man thus far, that light, heat, air, water, soil, and plants are necessary to his life. With these things we are constantly surrounded; and we can not get away from them; we can not live without them. However, we can not live *by* these things unless we use them in the way the Creator intended.

The body may become overheated, as in sunstroke, or it may become chilled or even frozen because of lack of heat.

The air may blow upon the body in such a way as to produce a cold, or even more serious difficulty.

By carelessness, incorrect positions, too much light, too little light, the sight may be hurt and even destroyed.

By bathing at improper times, by drinking too much or too little water, by getting the clothing wet and failing to remove it,—by all these things ill-health may be produced.

Tea, coffee, alcohol, all stimulants, uncooked foods, and

unripe or decaying fruits will bring on dyspepsia or indigestion. So will also the habit of bolting one's food, washing it down with water, eating too much, eating too many kinds at once, and eating between meals. The stomach can not put up with such treatment, and the master of the house says, "I am ill," or "I am sick."

It is plain, then, that if we would enjoy good health, we must learn how to *use* and not to *abuse* the things by which we are surrounded.

"What? know ye not that your body is the temple of the Holy Ghost which is in you, which ye have of God, and ye are not your own? For ye are bought with a price: therefore glorify God in your body, and in your spirit, which are God's." 1 Cor. 6: 19, 20.

Note Book Requirement

Explain how each of the following blessings may be misused, causing ill-health: light, heat, air, water, plants.

Lesson CXX

Our Homes

I went by the field of the slothful, and by the vineyard of the man void of understanding; and, lo, it was all grown over with thorns, and nettles had covered the face thereof, and the stone wall thereof was broken down. Then I saw, and considered it well: I looked upon it, and received instruction. Yet a little sleep, a little slumber, a little folding of the hands to sleep; so shall thy poverty come as one that traveleth; and thy want as an armed man. Prov. 24: 30-34.

I wonder what kind of picture the wise man would have described if he had visited the inside of the slothful man's house. If the entire family were as careless inside, not

only want and poverty must visit their home, but sickness as well. Unless our homes are kept clean and tidy, both inside and out, serious trouble may visit us.

Oftentimes scarlet fever, typhoid fever, or diphtheria come into a house, and people wonder how it is possible.

Go down into the cellar of that house. Do you find any vegetables there, such as potatoes, turnips, and beets, in a decaying condition? A cellar in this untidy condition is a very favorable place for the growth of disease germs.

"HOME, SWEET HOME"

Go into the back yard. Is all the waste material from the kitchen thrown upon the ground just a few feet from the back door? This pile of refuse is very dangerous. Disease germs can thrive here very rapidly.

Does this family get their drinking water from a well near the barnyard; and does the earth slope from the barnyard toward the well? Water from such a well will be likely to give typhoid fever.

How about the flies? Are there many of them in the house? You know they carry disease germs.

The Lord is so particular about the matter of cleanliness that He gave His ancient people laws about keeping not only their bodies, but their houses, free from filth.

If we want the angels of the Lord to encamp round about us, we will do all that we can to make our homes

clean, pleasant, and inviting. In this way we shall please our Father which is in heaven.

Note Book Requirement

On page 105, make a careful diagram of a well-arranged home.

Lesson CXXI

Accidents and Emergencies

A boy may cut himself with his knife or with an ax; he may burn his body severely; he may be stung by an insect; he may have the nosebleed; he may accidentally swallow some poison. Such things do happen every day. We will learn in this lesson a few of the simple helps for such times,—things which every boy and girl may have use for some day.

Nosebleed.—Keep the head erect, place a basin under the chin for the blood to run into, and then the patient should take several deep inspirations, filling the chest full at each breath. In most cases this will stop the bleeding. Ice may be applied to the nose.

Sunstroke.—The main thing to do is to lower the temperature. Remove the clothing from the body. Apply to the head chopped ice, wrapped in flannel. Rub ice over the chest, and place pieces under the armpits and at the sides. If there is no ice, use cloths wet with cold water. The body may be partially disrobed and sprinkled with ice water.

Stings.—If a piece of the sting remains in the flesh, pull it out with the fingers or with a pair of tweezers.

Apply weak ammonia water, after which a cloth moistened with sweet oil should be placed on the part.

Frost-bite.—The ears, the toes, the nose, and the fingers are occasionally frost-bitten or frozen. Rub the parts with snow, or with ice or snow water in a cold room. The circulation should be restored very slowly. Hot milk or other hot drinks should be taken freely.

Fainting.—When a person faints, he should be laid on the back at once, with the head very low. Give plenty of fresh air, and dash cold water on the head and neck if necessary. Loosen all the tight clothing.

If an insect crawls into the ear, drop in a little sweet oil or molasses, gently raising the tip of the ear to cause the fluid to run in more readily. Wash out the substance with a little warm water.

Bits of food lodged in the throat may be removed easily by the forefinger, or by sharp slaps on the back.

Cinders or particles of dust may often be removed from the eye with the twisted corner of a handkerchief carefully used. Do not rub the eye. The upper lid may be turned back and the substance thus found and removed, but this requires skilled help. Really, the best way, if one has self-control enough to do it, is to shut the eye and hold it *perfectly still* for several minutes. The cinder or dust particle will be washed toward the inner corner of the eye by the natural eye fluid, and then can be easily removed.

Note Book Requirement

On page 104 explain what should be done in case of a burn, of fainting; and of some other accident.

KINDNESS TO ANIMALS

Lesson CXXII

Man's Relation to Animals

A righteous man regardeth the life of his beast. Prov. 12:10.

Speaking to His Son, God said, "Let Us make man in Our image, after Our likeness." He indicated what was to be man's position in the great work of creation. These are His words as found in Gen. 1:26: "God said, Let Us make man in Our image, after Our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth."

So man was created at the head of the animal kingdom, to have rule and dominion over all the creatures which God had created on the fifth and sixth days of creation.

The powers of man's mind were so well developed that he was able to appreciate the things which God had made; and in return for his blessings, he was to render grateful praise to his Creator.

The lower animals were not given the power of reason, so that they could think upon God's creation and express their appreciation in an intelligent way.

David says: "What is man, that Thou art mindful of him? and the son of man, that Thou visitest him? For Thou hast made him a little lower than the angels, and hast crowned him with glory and honor. Thou madest him to have dominion over the works of Thy hands; Thou hast put all things under his feet; all sheep and oxen, yea, and the beasts of the field; the fowl of the air, and the fish of the sea, and whatsoever passeth through the paths of the seas." Ps. 8:4-8.

At the present time we find that this relationship which God designed should exist between man and the animals has been broken, and that many of the animals are estranged from man. Many of them are his enemies instead of being his friends.

In a future lesson we shall learn what brought about this condition of things; but it is easy to see that God made the lower animals to be servants to man, and to express their love and affection for him in many ways of humble service.

In return, man was to treat the animals with the spirit of kindness and love.

Note Book Requirement

On page 106 write a story about your favorite pet.

Lesson CXXIII

Man's Relation to Man

Therefore all things whatsoever ye would that men should do to you, do ye even so to them. Matt. 7:12.

We have considered man's relation to his surroundings, including light, heat, air, water, soil, plants, and animals. Now we shall consider him with reference to his relation to his fellow beings. We find in the word of God a rule of life, showing how we should relate ourselves to all of God's creatures.

The law of God, called the ten commandments, is the great rule of life. The last six precepts speak of our relation to our fellow men, while the first four speak of our duty toward God.

Christ, in speaking of the great principles of the ten commandments, sums them up in these words: "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind. This is the first and great commandment. And the second is like unto it, Thou shalt love thy neighbor as thyself." Matt. 22: 37-39.

LOVE ONE ANOTHER

You see by this scripture that we are to manifest the spirit of love toward our fellow creatures. We are not to love only those who love us, but we are also to love our enemies. Christ said, "Love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you, and persecute you; that ye may be the children of your Father which is in heaven." Then He gives the reason why we should do this: "For He [God] maketh His sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust." Matt. 5: 44, 45.

Man is very selfish by nature, and naturally looks out for himself. How often we hear the expression, "I am going to look out for number one;" or, "If I don't look out for myself, no one will look out for me." But this spirit is entirely contrary to that which Paul exhorts us to have: "Let nothing be done through strife or vainglory; but in lowliness of mind let each esteem other better than themselves. Look not every man on his own things, but every man also on the things of others." Phil. 2: 3, 4.

When we have this spirit of love and sacrifice for others, it proves that we have been born again—in other words, that we have been converted. "We know that we have passed from death unto life, because we love the brethren. He that loveth not his brother abideth in death. Whosoever hateth his brother is a murderer; and ye know that no murderer hath eternal life abiding in him." 1 John 3: 14, 15. "A new commandment write I unto you, that ye love one another." Is this commandment new to us? It may not be new as far as having read it or heard it before, but it may be new in our experience.

Questions

1. What great rule in the Bible do we find which makes plain man's relation to all God's creatures?
2. What portion of this rule shows our relation to our fellow men?
3. What commandments show man's relation to his Creator?
4. In what two commandments does Christ sum up the principles of the ten commandments?
5. Shall we love only those who love us?
6. Why should we love our enemies?
7. Naturally is not man more careful to look out for his own interests than for those of his neighbor?

8. What expressions are often heard which show this spirit of selfishness?
9. What spirit are we exhorted by Paul to have?
10. What does this spirit of love prove?

Lesson CXXIV

Man's Relation to God

Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind. Matt. 22: 37.

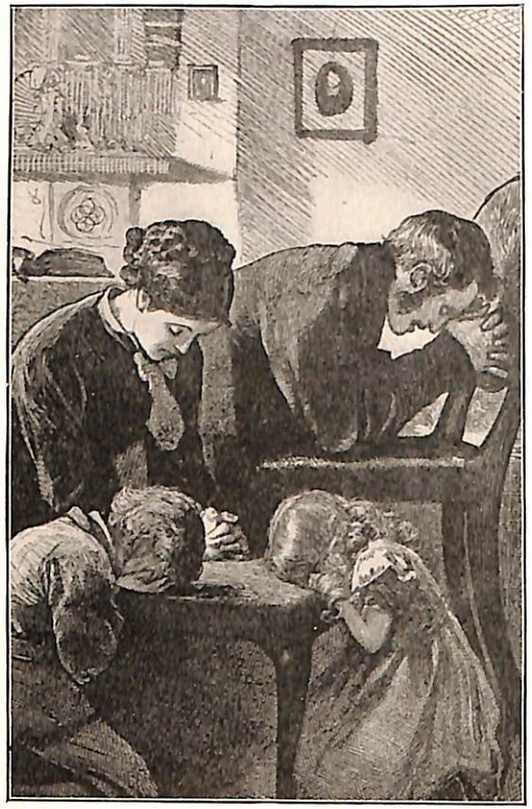
We learn by reading Gen. 1: 27 that God created man in His own image. This does not mean simply God's physical image, but also His spiritual image; in other words, that man was created with the same character which God possesses.

God created man that He might have creatures upon whom to bestow His love, and that they in turn might show their love and gratitude toward Him.

The first four commandments show plainly the relation of man to God. The first commandment, "Thou shalt have no other gods before Me," shows that man is to bestow his supreme love and affection upon his Maker, and that nothing is to come between him and his God.

There is great danger of our becoming so taken up with the things which God has created, that we shall bestow our love and affection upon them instead of on the One who made them. This was the case with the people who lived before the flood. They took the treasures of nature, and used them for their own selfish purposes, instead of using them to glorify God.

Paul tells us that the things created reveal the Creator and His power. But the heathen, because of the selfishness of their hearts, forgot God and were in great darkness. He says of them that "when they knew God, they glorified Him not as God, neither were thankful; but became vain in their imaginations, and their foolish heart was darkened. Professing themselves to be wise, they became fools, and . . . changed the truth of God into a lie, and worshiped and served the creature more than the Creator."



FAMILY WORSHIP

There is danger of our doing the very same thing to-day. We learn that God created all things for His pleasure. The Lord tells us through the prophet Isaiah that He has created man for His glory; so the one thought in our minds should continually be, What can I do to glorify my Maker?

Christ tells us how we can do this. He says, "Let your light so shine before men, that they may see your good works, and glorify your Father which is in heaven." Matt. 5: 16.

Questions

1. In whose image was man created?
2. Does this mean simply his physical image?
3. Why was man created?
4. For what purpose does he exist?
5. What does the first commandment mean to you?
6. In our study of nature, is there any danger of our becoming so interested in the creature that we entirely lose sight of the Creator?
7. What instance is recorded of such experience?
8. What was the result?
9. Why did these people forget God?
10. Is there any danger of our experience being similar?
11. For what were all things created?
12. How may we glorify our Maker?
13. What happened to a man who was not willing to give God the glory due unto His name? Acts 12: 20-23.

Note Book Requirement

On page 107 write what you understand should be man's relation to man and to his Creator.

CHAPTER XII

THE SABBATH

(Scripture Basis, Gen. 2:1-3)

"The Son of man is Lord also of the Sabbath."

Lesson CXXV

The Creation of the Sabbath

"God saw everything that He had made, and, behold, it was very good. And the evening and the morning were the sixth day." Gen. 1: 31.

"Thus the heavens and the earth were finished, and all the host of them.

"And on the seventh day God ended His work which He had made; and He rested on the seventh day from all His work which He had made.

"And God blessed the seventh day, and sanctified it: because that in it He had rested from all His work which God created and made." Gen. 2: 1, 2, 3.

"The creation was now complete. . . . Eden bloomed on earth. Adam and Eve had free access to the tree of life. No taint of sin or shadow of death marred the fair creation. 'The morning stars sang together, and all the sons of God shouted for joy.'

"The great Jehovah had laid the foundations of the earth; and He had dressed the whole world in a garb of beauty, and had filled it with things useful to man; He had created all the wonders of the land and of the sea. In six days the great work of creation had been accomplished. And God 'rested on the seventh day from all His work which He had made. And God blessed the seventh day, and sanctified it; because that in it He had rested from all His work which God created and made.' God looked with satisfaction upon the work of His hands. All was perfect, worthy of its divine Author, and He rested, not as one weary, but as well pleased with the fruits of His wisdom and goodness and the manifestations of His glory.

"After resting upon the seventh day, God sanctified it, or set it apart, as a day of rest for man. Following the example of the Creator, man was to rest upon this sacred day, that as he should look upon the heavens and the earth, he might reflect upon God's work of creation; and that as he should behold the evidences of God's wisdom and goodness, his heart might be filled with love and reverence for his Maker."

Questions

1. During how many days was God engaged in the work of creation?
2. What did He do each day?

3. When God had finished, what did He say of all the things He had made?
4. What did God say of the work of His hands?
5. What did the Creator do upon the seventh day?
6. Was God weary from labor?
7. What did God do during the seventh day?
8. What did God do after He had rested?
9. Why did He bless and sanctify the day?
10. What command had God given His people concerning the Sabbath? Ex. 20: 8.

Lesson CXXVI

How to Enjoy the Sabbath Blessing

Call the Sabbath a delight, the holy of the Lord, honorable. Isa. 58:13.

The word *Sabbath* means "rest." God placed His blessing upon His rest-day.

To sanctify means "to set apart for a holy or sacred use." The Creator sanctified the seventh day. Because He blessed and sanctified it, He called the seventh day His holy day.

Because He worked six days and rested upon the seventh, He commanded man to do the same. Ex. 20: 8-11. Those who obey this command will never forget their Creator. Even in Eden the Sabbath was to have been a blessing to man.

God gave the Sabbath that we might once every week have our minds directed to the Creator and His works. If upon this day we will lay aside our own work, will lay aside our own thoughts, and spend the day in the study of His word and His works, our hearts will swell with love

and worship, and we shall thank God for the blessing He has placed in the Sabbath.

IN GOD'S GREAT OUT-OF-DOORS

Questions

1. What is the meaning of the word *Sabbath?*
2. What does it mean to "sanctify" a thing?
3. How many, and what day or days, did God sanctify?
4. Why is the seventh day holy?
5. Why did God command man to rest upon the seventh day?
6. What will be the result if we obey this commandment?
7. When was the Sabbath given to Adam, before or after he sinned?
8. What should we study upon the Sabbath?
9. What must we not think about?
10. Do you observe the Sabbath, and do you get this blessing?

Note Book Requirement

On page 108 write from memory the Sabbath commandment.

CHAPTER XIII

THE FALL OF MAN

(Scripture Basis, Genesis 2 and 3)

"Cursed is the ground for thy sake. . . . In the sweat of thy face shalt thou eat bread, till thou return unto the ground."

Lesson CXXVII

The First Sin

Thou wast perfect in thy ways . . . till iniquity was found in thee. Eze. 28:15.

Among the holy beings who lived before the world was created, was one whose name is given in Isa. 14: 12.

The name *Lucifer* means the "light-bearer" or "shining one."

Although only a created being, depending upon God for his very existence, he said in his heart: "I will ascend into heaven, I will exalt my throne above the stars of God: I will sit also upon the mount of the congregation, in the sides of the north: I will ascend above the heights of the clouds; I will be like the Most High."

Lucifer was "perfect in his ways," "full of wisdom and perfect in beauty," until he lifted up his heart because of his brightness. Eze. 28: 11-19.

It was little by little that Lucifer "ventured to covet homage due alone to his Creator." [See "Patriarchs and Prophets," page 35.]

Lucifer was especially jealous of Jesus, who shared the Father's throne.

The Son of God had worked with the Father in creating all the hosts of heaven, and in the creation of the angels as well, and in times past they had all joyfully worshiped the Son, as well as the Father.

There came a time when, although Lucifer bowed with the angels, feelings of jealousy and envy filled his heart. "Why is Christ honored above Lucifer?" he questioned. Secretly he worked to spread the same feeling among the angels.

God bore long with Lucifer, but as he cherished these feelings he grew more and more unhappy and dissatisfied. He left his position as covering cherub, because he could not be one with God as was Christ.

The loyal angels labored with him. But he was a deceiver. He claimed that he loved God, that he loved the angels, that he wished only to make them happier.

He saw that he was in the wrong, but he would not confess it. He would not return to God, and he continued to spread discord in heaven.

He determined that he would never again honor and worship the Son of God. He promised all who would enter his ranks that he would establish a new and better king-

dom. He led away one third of the angels of heaven for he had much power and influence.

Lucifer had a deep-laid plan to overthrow God's government. Not even the loyal angels understood this purpose fully. Sin was a strange, new thing in God's universe. But rather than give up his own way, Lucifer chose to leave the courts of God. He was cast out of heaven.

Questions

1. Who was Lucifer?
2. What does the name mean?
3. Upon whom did he depend for life?
4. What did he say in his heart?
5. Until what time was Lucifer perfect in all his ways?
6. Of whom was he especially jealous? Why?
7. What did he question?
8. How did he work to spread his feelings of jealousy?
9. Why did he leave his position as covering cherub?
10. Who labored with him?
11. What was he unwilling to do?
12. What did he promise to all who would enter his ranks?
13. What part of the angels were led away?
14. What was finally done with Lucifer and those who were loyal to him?

Lesson CXXVIII

An Enemy

And the serpent said unto the woman, Ye shall not surely die. Gen. 3: 4.

Lucifer became Satan, the deceiver, the tempter, the evil one.

He was not satisfied that one third only of the heavenly beings should follow in his steps. He determined to deceive and lead into sin just as many of the holy and happy beings of other worlds as possible.

He was especially interested in this earth—our earth—the one that had been created since his fall.

He determined to secure control of it, if possible, and place here the seat of his government. He instructed his companions to work untiringly, for all whom they could lead into sin would swell their ranks and build up their power.

The Creator did not leave His creatures at the mercy of their foe. He sent warnings throughout the universe; and holy angels visited Adam and Eve in the garden of Eden, their beautiful home, to teach them of their heavenly Father and His love, and of their wily enemy.

God does not wish any of His creatures to serve Him because they are afraid of Him. He wants their voluntary obedience, because they love Him.

There was seen a beautiful world, full of everything to make man happy, full of everything that could interest and please,—all a gift to man from his Creator. Of course Adam and Eve were happy. Why should they not be happy?

Satan looked upon their happiness with jealousy.

Questions

1. Why was Satan especially interested in this earth?
2. Did the Creator leave His creatures at the mercy of their foe?
3. What kind of service does God accept?
4. Were our first parents happy?
5. Did they know that Satan would visit their home?
6. How were they to show their love to God?
7. What was the command God gave? Gen. 2:16, 17.
8. What warning? Gen.2:17.
9. What medium did Satan use to deceive Eve? Gen. 3:1.
10. How did this creature compare with the beasts of the field?

11. How did Satan tempt Eve?
12. How did she reply?
13. What great falsehood did Satan tell?
14. What did he say would be the result of disobedience?

Lesson CXXIX

The Results of Sin

The wages of sin is death. Rom. 6:23.

Satan led our first parents to believe that they would gain wisdom by breaking the command of God.

He had found that sin meant loss; but he was determined, if possible, to draw others into the same misery. "Ye shall be as gods," he said, "knowing good and evil."

CREATION IS MARRED

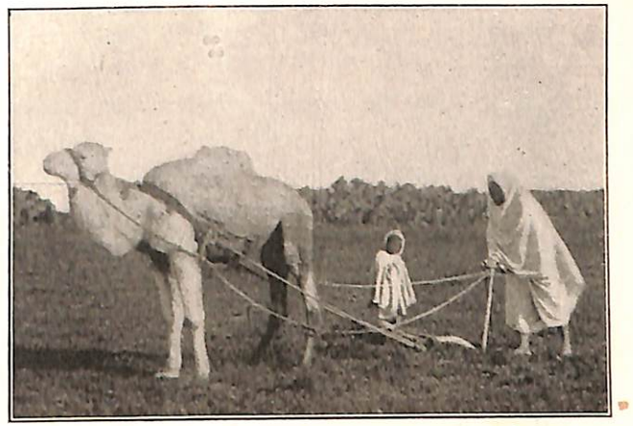
They knew the "good" already. What was this strange thing "evil" which the Creator had withheld? They were now to learn.

As soon as they had eaten the fruit, they felt their guilt. The love and peace which had before filled their hearts, gave place to terror.

The robes of light with which they were clothed, fell from them, and they saw that they were naked. The air

seemed colder, and their bodies were chilled. They felt the need of garments.

Satan exulted. He knew that God was dishonored. He suggested to Adam and Eve excuses for their sin. These they found to be insufficient when they were questioned by their Creator.



TILLING THE GROUND IN ALGERIA, AFRICA.

"To Adam the Lord declared: 'Because thou hast hearkened unto the voice of thy wife, and hast eaten of the tree, of which I commanded thee, saying, Thou shalt not eat of it; cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life. Thorns also and thistles shall it bring forth to thee; and thou shalt eat the herb of the field. In the sweat of thy face shalt thou eat bread, till thou return unto the ground; for out of it wast thou taken; for dust thou art, and unto dust shalt thou return.'

"It was not the will of God that the sinless pair should know aught of evil. He had freely given them the good, and had withheld the evil. But, contrary to His command, they had eaten of the forbidden tree, and now they would continue to eat of it—they would have the knowledge of evil—all the days of their life. From that time the race

would be afflicted by Satan's temptations. Instead of the happy labor heretofore appointed them, anxiety and toil were to be their lot. They would be subject to disappointment, grief, and pain, and finally to death."

Questions

1. How did Satan claim that wisdom could be obtained?
2. What did he promise Eve if she would eat of the forbidden tree?
3. Was Satan happy after he had sinned?
4. Were Adam and Eve happy afterward?
5. What change took place immediately?
6. Whom did Adam blame for his disobedience?
7. Whom did Eve blame?
8. What sentence did God pronounce upon the serpent?
9. What sentence upon Eve?
10. Upon Adam?

Note Book Requirement

On page 109 explain why man fell.

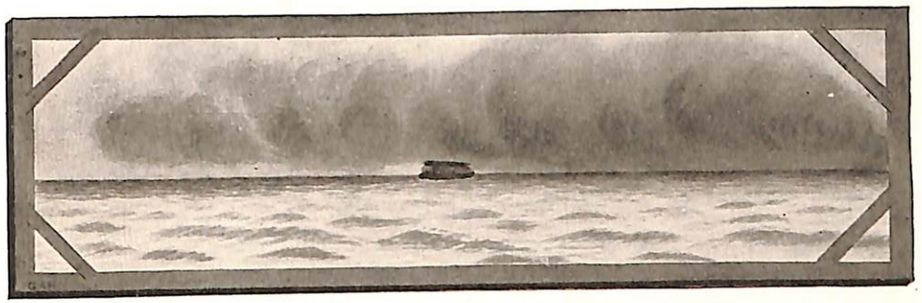
"All-seeing, powerful God!
Who can with Thee contend?
Or who, that tries the unequal strife,
Shall prosper in the end?

"If He our ways should mark
With strict, inquiring eyes,
Could we for one of thousand faults
A just excuse devise?"

CHAPTER XIV

THE FLOOD

(Scripture Basis, Genesis 6 to 9)



"Behold, I, even I, do bring a flood of waters upon the earth."

Lesson CXXX

The Plan of Salvation

While we were yet sinners, Christ died for us. Rom. 5:8.

"The fall of man filled all heaven with sorrow. The world that God had made was blighted with the curse of sin, and inhabited by beings doomed to misery and death. There appeared no escape for those who had transgressed the law. Angels cease their songs of praise. Throughout the heavenly courts there was mourning for the ruin that sin had wrought.

"The Son of God, Heaven's glorious Commander, was touched with pity for the fallen race. His heart was moved

with infinite compassion as the woes of the lost world rose up before Him. But divine love had conceived a plan whereby man might be redeemed. The broken law of God demanded the life of the sinner.

"In all the universe there was but one who could, in behalf of man, satisfy its claims. Since the divine law is as sacred as God Himself, only one equal with God could

"GOD SO LOVED THE WORLD THAT HE GAVE HIS ONLY-BEGOTTEN SON"

make atonement for its transgression. None but Christ could redeem fallen man from the curse of the law, and bring him again into harmony with Heaven. Christ would take upon Himself the guilt and shame of sin,—sin so offensive to a holy God that it must separate the Father and His Son. Christ would reach to the depths of misery to rescue the ruined race.

"Before the Father He pleaded in the sinner's behalf,

while the host of heaven awaited the result with an intensity of interest that words can not express. Long continued was that mysterious communing,—'the counsel of peace' for the fallen sons of men. The plan of salvation had been laid before the creation of the earth; for Christ is 'the Lamb slain from the foundation of the world;' yet it was a struggle, even with the King of the universe, to yield up His Son to die for the guilty race. . . .

"The plan by which alone man's salvation could be secured, involved all heaven in its infinite sacrifice. The angels could not rejoice as Christ opened before them the plan of redemption; for they saw that man's salvation must cost their loved Commander unutterable woe.

"In grief and wonder they listened to His words as He told them how He must descend from heaven's purity and peace, its joy and glory and immortal life, and come in contact with the degradation of earth, to endure its sorrow, shame, and death. He was to stand between the sinner and the penalty of sin; yet few would receive Him as the Son of God.

"He would leave His high position as the Majesty of heaven, appear upon earth and humble Himself as a man, and by His own experience become acquainted with the sorrows and temptations which man would have to endure. All this would be necessary in order that He might be able to succor them that should be tempted.

"When His mission as a teacher should be ended, He must be delivered into the hands of wicked men, and be subjected to every insult and torture that Satan could inspire them to inflict.

"He must die the cruelest of deaths, lifted up between the heavens and the earth as a guilty sinner.

"He must pass long hours of agony so terrible that angels could not look upon it, but would veil their faces from the sight. He must endure anguish of soul, the hiding of His Father's face, while the guilt of transgression—the weight of the sins of the whole world—should be upon Him.

"The angels prostrated themselves at the feet of their Commander, and offered to become a sacrifice for man. But an angel's life could not pay the debt; only He who had created man had power to redeem him.

"Yet the angels were to have a part to act in the plan of redemption. Christ was to be made 'a little lower than the angels for the suffering of death.' As He should take human nature upon Him, His strength would not be equal to theirs, and they were to minister to Him, to strengthen and soothe Him under His sufferings.

"They were also to be ministering spirits, sent forth to minister for them who should be heirs of salvation. They would guard the subjects of grace from the power of evil angels, and from the darkness constantly thrown around them by Satan."

Questions

1. How did the fall of man affect all heaven?
2. What were the feelings of the Son of God?
3. What did the broken law demand?
4. Was there any one who could satisfy the demands of the law in man's place?
5. Was Christ willing to do this?
6. What would this mean?
7. Before whom did He plead in the sinner's behalf?
8. What name is given to this counsel for the fallen sons of men?
9. Had the plan of salvation been thought of before?
10. Was God willing to give up Jesus?

11. Could the angels rejoice when they heard of this plan?
12. What did angels offer to do?
13. Why would not an angel's life redeem (buy back) sinners?

Lesson CXXXI

The Earth Destroyed by Water

The world that then was, being overflowed with water, perished. 2 Peter 3:6.

"They have chosen me as their ruler," said Satan. "My plans shall be carried out in the earth." Why should Satan not expect that a way of escape would be offered man? Had it not been offered him at the very beginning of his course? But he had spurned salvation, and he would lead mankind to do the same.

The deceiver began his work. He led man deeper and deeper into sin. He led him to make a wrong use of the blessings with which he was surrounded. He introduced the worship of the creature instead of the Creator. Man became unthankful and unholy.

"God saw that the wickedness of man was great in the earth, and that every imagination of the thoughts of his heart was only evil continually."

And the Lord said, "My spirit shall not always strive with man, for that he also is flesh: yet his days shall be an hundred and twenty years."

"And it repented the Lord that He had made man on the earth, and it grieved Him at His heart.

"And the Lord said, I will destroy man whom I have created from the face of the earth; both man, and beast,

and the creeping thing, and the fowls of the air; for it repenteth Me that I have made them.

"But Noah found grace in the eyes of the Lord."

Note Book Requirement

Prepare an outline, and from the outline write a story of "the earth before the flood," on page 110.

Lesson CXXXII

How the Flood Marred Creation

And every living substance was destroyed which was upon the face of the ground. Gen. 7: 23.

"In the six hundredth year of Noah's life, in the second month, the seventeenth day of the month, the same day were all the fountains of the great deep broken up, and the windows of heaven were opened." Gen. 7: 11.

"And the flood was forty days upon the earth; and the waters increased, and bare up the ark, and it was lift up above the earth.

AFTER A FLOOD (GALVESTON, TEXAS)

"And the waters prevailed, and were increased greatly upon the earth; and the ark went upon the face of the waters.

"And the waters prevailed exceedingly upon the earth;

and all the high hills, that were under the whole heaven, were covered.

"Fifteen cubits upward did the waters prevail; and the mountains were covered.

"And all flesh died that moved upon the earth, both of fowl, and of cattle, and of beast, and of every creeping thing that creepeth upon the earth, and every man:

"All in whose nostrils was the breath of life, of all that was in the dry land, died.

"And every living substance was destroyed which was upon the face of the ground, both man, and cattle, and the creeping things, and the fowl of the heaven; and they were destroyed from the earth: and Noah only remained alive, and they that were with him in the ark.

"And the waters prevailed upon the earth an hundred and fifty days." Gen. 7: 17-24.

"And it came to pass in the six hundredth and first year, in the first month, the first day of the month, the waters were dried up from off the earth: and Noah removed the covering of the ark, and looked, and, behold, the face of the ground was dry.

"And in the second month, on the seven and twentieth day of the month, was the earth dried." Gen. 8: 13, 14.

The earth after the flood was one vast burial ground. The strong wind, which God had sent to dry up the waters, had heaped up trees, rocks, and earth above the bodies of the dead. The great forests that grew upon the earth before the flood were covered, and silver, gold, and precious stones were hidden from the sight of men.

To-day, as men dig down into the earth's crust, they

find proof that the Bible record is true. Skeletons of men, enormous beasts, fishes, and fowls are found turned into stone. We are digging into the earth's vast burial ground.

Not only do they find skeletons of animals, but skeletons of vegetable life—whole forests of stone; and because in these beds of black stone there is stored away so much of the light and heat of that long-ago time, we are able to use it as fuel in our homes to-day.

There is not a single curse that God ever brought, but has connected with it a blessing. Did you ever think about that?

Lesson CXXXIII

The Repeopling of the Earth

He created it not in vain, He formed it to be inhabited. Isa. 45:18.

"And God spake unto Noah, saying, Go forth of the ark, thou, and thy wife, and thy sons, and thy sons' wives with thee.

"Bring forth with thee every living thing that is with thee, of all flesh, both of fowl, and of cattle, and of every creeping thing that creepeth upon the earth; that they may breed abundantly in the earth, and be fruitful, and multiply upon the earth.

"And Noah went forth, and his sons, and his wife, and his sons' wives with him.

"Every beast, every creeping thing, and every fowl, and whatsoever creepeth upon the earth, after their kinds, went forth out of the ark.

"And Noah builded an altar unto the Lord; and took

of every clean beast, and of every clean fowl, and offered burnt-offerings on the altar." Gen. 8: 15-20.

"And God blessed Noah and his sons, and said unto them, Be fruitful, and multiply, and replenish the earth." Gen. 9: 1.

"And the whole earth was of one language, and of one speech.

"And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar; and they dwelt there.

"And they said one to another, Go to, let us make brick, and burn them thoroughly. And they had brick for stone, and slime had they for mortar.

"And they said, Go to, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth.

"And the Lord came down to see the city and the tower, which the children of men builded.

"And the Lord said, Behold, the people is one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do.

"Go to, let Us go down, and there confound their language, that they may not understand one another's speech.

"So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city.

"Therefore is the name of it called Babel; because the Lord did there confound the language of all the earth: and from thence did the Lord scatter them abroad upon the face of all the earth." Gen. 11: 1-9.

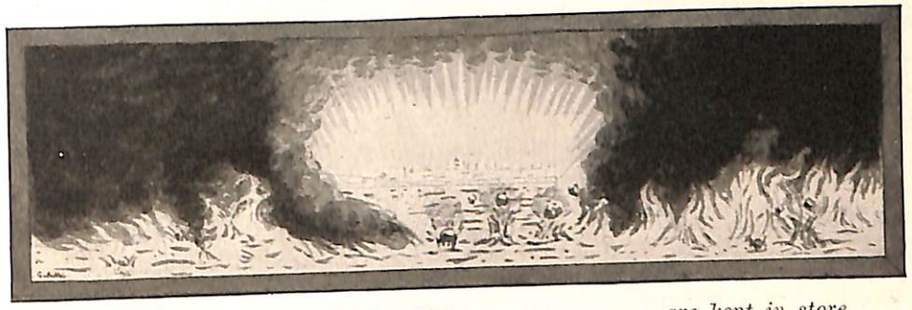
Questions

1. What command did God give to Noah concerning leaving the ark?
2. How many people had been saved?
3. How did Noah show his gratitude to God for His care during the time of the flood?
4. How many languages were spoken in Noah's day?
5. What kind of work did the sons of Noah undertake on the plains of Shinar?
6. What was their object in building the tower?
7. What did the Lord do to hinder their work?
8. What was the result of confounding their language?
9. Why was the tower called Babel?
10. How widely did the people scatter out as a result of the confusion of tongues?

CHAPTER XV

THE FINAL DESTRUCTION

(Scripture Basis, 2 Peter 3:3-14)



"The heavens and the earth, which are now . . . are kept in store, reserved unto fire."

Lesson CXXXIV

The Earth Destroyed by Fire

The earth also and the works that are therein shall be burned up. 2 Peter 3:10.

About two thousand years after the first destruction of the world, Jesus, the Son of God, came to this earth. He was born a babe in Bethlehem. He lived, and suffered, and died for the sins of men. He paid the price for man's salvation, left the message of the Father's love with the people, and became an intercessor for man.

This work of interceding for man, of leading men to repent of their sins, and giving them strength to overcome

the evil that is in the natural heart, is the Saviour's work still. It has been His work in all ages. Before the flood He was the Saviour; after the flood, before He was born into this world, and ever since He has returned to the Father, He has been the Saviour.

Now God knew, when He gave His Son for sinful man, that many would not accept the salvation that He would offer. Jesus knew this, too, but He knew also that many would repent, and be saved. He died to save all, but all will not believe on Him that they may be saved.

Of course Satan has worked hard to defeat God's plan. Ever since his first success in the garden of Eden, he has been laboring untiringly to secure subjects in his cause. In carrying out his plans he has caused so much suffering and misery that angels, and holy beings upon other worlds, who have seen his true character, wonder that God spares him to carry on his work any longer.

And it is not God's purpose to allow Satan to exist forever. It is His plan to make an end of sin. "Affliction shall not rise up the second time." Nahum 1: 9.

"For, behold, the day cometh, that shall burn as an oven; and all the proud, yea, and all that do wickedly, shall be stubble: and the day that cometh shall burn them up, saith the Lord of hosts, that it shall leave them neither root nor branch." Mal. 4: 1.

In this great destruction of sin and iniquity—this final and complete destruction—Satan shall fall, being brought "to ashes upon the earth in the sight of all them that behold thee."

"All they that know thee among the people shall be

astonished at thee: thou shalt be a terror, and never shalt thou be any more."

The fire that destroys Satan and his subjects will melt the elements with fervent heat. "The earth also, and the works that are therein shall be burned up." 2 Peter 3: 10.

Questions

1. About how long has it been since the destruction of the earth by a flood?
2. How long has it been since Jesus was born in Bethlehem?
3. Why did Jesus suffer and die?
4. What is the work of an intercessor?
5. What is Satan's work?
6. What has Satan revealed to all the holy beings in God's universe?
7. Is it God's will to allow sin to continue forever?
8. How is it going to be destroyed?
9. What will finally become of Satan, the originator of sin?
10. What will happen to the earth and all the works that are therein?

Note Book Requirement

On page 111 tell of the earth's final destruction.

Lesson CXXXV

A Message of Warning

Cry aloud, spare not, lift up thy voice like a trumpet. Isa. 58:1.

Before the destruction of the earth by the flood of water, God sent a warning message to the world by the faithful Noah. Noah preached to the people for one hundred and twenty years. To all was given an opportunity to repent of their sins, and be saved in the ark.

THE THREE MESSAGES

"Surely the Lord will do nothing, but He revealeth His secret unto His servants the prophets."

Those who believe God's holy word and study the message He sends to us through the prophets, will not be taken unawares. The final destruction of the earth will be, to them, no surprise.

When Jesus ascended to His Father in heaven, He told His disciples to go into all the world, and carry the gospel of the kingdom to all nations. He comforted them with the thought that He would return again.

He wishes the message of His return to be preached in all the world.

To the prophet John He gave a vision of three angels flying in the midst of heaven, proclaiming three messages of warning. Do you know where in the Bible to find these three messages?

These angels represent God's true people, who are now preaching in the whole world these messages of warning.

Jesus Himself mentioned special signs by which all might know that the end of the world was "at the door." What were some of these signs? And where in the Bible can you read about them?

We are told in one verse that "this generation [the generation that sees the signs] shall not pass till all these things be fulfilled."

"And this gospel of the kingdom shall be preached in all the world for a witness unto all nations; and then shall the end come."

Questions

1. Through whom did God send warning concerning the destruction of the earth by a flood?
2. Does the Lord bring destruction upon the earth without first giving a warning?
3. Through whom does He send warning?
4. Will the final destruction of the earth be a complete surprise?
5. Does Satan know that his time is short?
6. What does the Lord call upon His disciples to do?
7. Are you one of His disciples?
8. What part are you having in this work?
9. Can you repeat the warning messages given by the three angels?
10. Explain their meaning.
11. How do you know that you are a member of the generation that will see Jesus come in the clouds of heaven?
12. When will the end come?

Lesson CXXXVI

The Future Desolation of the Earth

That day is a day of wrath, a day of trouble and distress, a day of wasteness and desolation. Zeph. 1:15.

When the "end" comes, Jesus will leave His place as intercessor in the heavenly sanctuary, and plagues will be poured out on the earth and its inhabitants.

The plagues are called the seven last plagues, and are more fearful than anything ever before visited upon the earth.

THE RESULTS OF AN EARTHQUAKE

These plagues will not fall upon the people of God. "A thousand shall fall at thy side, and ten thousand at thy right hand; but it shall not come nigh thee.

"Only with thine eyes shalt thou behold and see the reward of the wicked.

"Because thou hast made the Lord, which is my refuge, even the Most High, thy habitation;

"There shall no evil befall thee, neither shall any plague come nigh thy dwelling." Ps. 91: 7-10.

"The Lord cometh out of His place to punish the inhabitants of the earth for their iniquity." Isa. 26: 21.

"And the slain of the Lord shall be at that day from

one end of the earth even unto the other end of the earth: they shall not be lamented, neither gathered, nor buried." Jer. 25: 33.

"At the coming of Christ the wicked are blotted from the face of the whole earth,—consumed with the spirit of His mouth, and destroyed by the brightness of His glory. Christ takes His people to the city of God, and the earth is emptied of its inhabitants. 'Behold, the Lord maketh the earth empty, and maketh it waste, and turneth it upside down, and scattereth abroad the inhabitants thereof.' 'The land shall be utterly emptied, and utterly spoiled; for the Lord hath spoken this word.'

" 'Because they have transgressed the laws, changed the ordinance, broken the everlasting covenant. Therefore hath the curse devoured the earth, and they that dwell therein are desolate: therefore the inhabitants of the earth are burned.'

"The whole earth appears like a desolate wilderness. The ruins of cities and villages destroyed by the earthquake, uprooted trees, ragged rocks thrown out by the sea or torn out of the earth itself, are scattered over its surface, while vast caverns mark the spot where the mountains have been rent from their foundations."

Here is to be the home of Satan with his evil angels for a thousand years. Here he will be confined, to wander up and down over the broken surface of the earth, and see the effects of his rebellion against the law of God. For a thousand years he can enjoy the fruit of the curse which he has caused. (Read Revelation 20.)

Lesson CXXXVII

God's People Delivered

At that time thy people shall be delivered, every one that shall be found written in the book. Dan. 12:1.

Just before Jesus appears in the clouds of heaven, Satan will excite wicked men to persecute the children of God. They are plunged into deep trouble. Satan makes the people believe that God's commandment-keeping people are to blame for the terrible plagues that visit the earth.

Finally the wicked appoint a time for God's people to be slain. They determine that in one night they will put them to death.

On the very night that armed men prepare to slay them, Jesus will appear in the clouds of heaven and His people will be delivered. They are precious in His sight, and He will not forget them.

While they are praying to God for protection, a "dense blackness, deeper than the darkness of night, falls upon the earth. Then a rainbow, shining with glory from the throne of God, spans the heavens, and seems to encircle each praying company."

What becomes of the angry multitude? "Their mocking cries die away." They forget their purpose. They are filled with fear.

They hear the voice of God. To the righteous it is sweetest music, but to the wicked, alas! it speaks awful doom.

"It is at midnight that God manifests His power for the deliverance of His people. The sun appears shining in its strength."

The mighty earthquake and the other signs and wonders do not terrify God's people. They say, "God is our refuge and strength, a very present help in trouble."

"Therefore will not we fear, though the earth be removed, and though the mountains be carried into the midst of the sea;

"Though the waters thereof roar and be troubled, though the mountains shake with the swelling thereof." Ps. 46: 1-3.

A bright star beams through a rift in the clouds. It speaks joy to the faithful, but wrath to those who have broken God's holy law.

"Then there appears against the sky a hand holding two tables of stone folded together." The tables are opened that all may read their plain statements, traced as with a pen of fire before their eyes.

"The voice of God is heard from heaven, declaring the day and hour of Jesus' coming. Like peals of loudest thunder, His words roll through the earth."

Then appears in the east a small, black cloud about the size of a man's hand. This cloud, becoming more and more glorious, soon reveals the lovely Jesus coming to the earth as King of kings and Lord of lords, to deliver His people.

The sleeping saints are called from their graves by the voice of the Son of God. "For the Lord Himself shall descend from heaven with a shout, with the voice of the archangel, and with the trump of God: and the dead in Christ shall rise first:

"Then we which are alive and remain shall be caught up together with them in the clouds, to meet the Lord in the air: and so shall we ever be with the Lord."

CHAPTER XVI

THE NEW EARTH

(Scripture Basis, Revelation 21 and 22)

"Behold, I create new heavens and a new earth."

Lesson CXXXVIII

The Earth Purified

Old things are passed away; behold, all things are become new. 2 Cor. 5:17.

For a thousand years the earth is to lie desolate. The prophet Jeremiah was shown how the earth would look at this time. He describes it in these words:

"I beheld the earth, and, lo, it was without form, and void; and the heavens, and they had no light.

"I beheld the mountains, and, lo, they trembled, and all the hills moved lightly.

"I beheld, and, lo, there was no man, and all the birds of the heavens were fled.

"I beheld, and, lo, the fruitful place was a wilderness,

and all the cities thereof were broken down at the presence of the Lord, and by His fierce anger.

"For thus hath the Lord said, The whole land shall be desolate; yet will I not make a full end." Jer. 4: 23-27.

During this thousand years God's people are with Him in heaven, but Satan and his followers are "gathered together as prisoners are gathered in the pit." Isaiah says they "shall be shut up in prison, and after many days shall they be visited."

Then Jesus, at the end of the thousand years, visits the earth again, the second resurrection occurs—the resurrection of the wicked.

They see the holy city that comes down from God out of heaven. Under Satan's leadership they surround this city, and attempt to dethrone Christ, destroy God's people, and gain possession of the city of God.

Without the city is strife and battle too terrible to describe. In mercy, fire is sent down from God out of heaven. "The earth is broken up. The weapons concealed in its depths are drawn forth. Devouring flames burst from every yawning chasm. The very rocks are on fire. The day has come that shall 'burn as an oven.' Mal. 4: 1.

"The elements melt with fervent heat, the earth also, and the works that are therein are burned up. The earth seems one molten mass,—a vast, seething lake of fire. . . . In the cleansing flames the wicked are at last destroyed, root and branch,—Satan the root, his followers the branches. . . . The fire that consumes the wicked, purifies the earth. Every trace of the curse is swept away."

Lesson CXXXIX

God's Plan Fulfilled

It is done. Rev. 21:6.

After the earth is purified by fire, every trace of the curse will be gone.

"For, behold, I create new heavens and a new earth: and the former shall not be remembered, nor come into mind.

"But be ye glad and rejoice forever in that which I create: for, behold, I create Jerusalem a rejoicing, and her people a joy.

"And I will rejoice in Jerusalem, and joy in My people: and the voice of weeping shall be no more heard in her, nor the voice of crying. . . .

"And they shall build houses, and inhabit them; and they shall plant vineyards, and eat the fruit of them.

"They shall not build, and another inhabit; they shall not plant, and another eat: for as the days of a tree are the days of My people, and Mine elect shall long enjoy the work of their hands.

"They shall not labor in vain, nor bring forth for trouble; for they are the seed of the blessed of the Lord, and their offspring with them.

"And it shall come to pass, that before they call, I will answer; and while they are yet speaking, I will hear.

"The wolf and the lamb shall feed together, and the lion shall eat straw like the bullock: and dust shall be the serpent's meat. They shall not hurt nor destroy in all My holy mountain, saith the Lord."

Note Book Requirement

Write from memory a description of the new earth, and copy it on page 112.

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